AUTOMOTIVEINDUSTRIES

A CHILTON PUBLICATION

JANUARY 1, 1959

Features • • •

Better Year Ahead for the Automobile Industry

Latest Techniques at New Fisher Body Plant

Increased Use of Stainless Steel on Cars

Detroit Diesel Develops New Line of Engines

Engineering Developments in '59 Automobiles

New Fabricating Method Uses Heat Up to 30,000 F

Automotive and Aviation Manufacturing
ENGINEERING • PRODUCTION • MANAGEMENT

RYKOR

has performed in six tough applications

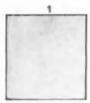
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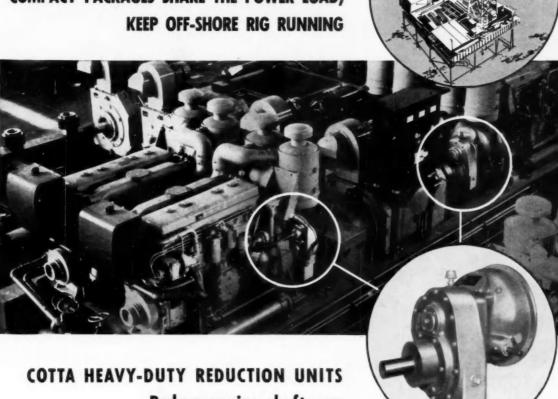
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Oven test shows high temperature performance of RYKON Grease. 1. Metal panel coated with RYKON and placed in oven at 350° F. 2. Same panel after five days. RYKON is still soft and ready to lubricate. 3. Another high-melt grease ready for same test. 4. Same panel after oven test. Grease has falled completely.

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AUTOMOTIVE INDUSTRIES

CHILTON MAGAZINE . PUBLISHED SEMI-MONTHLY

JANUARY I, 1959

VOL. 120 No. 1

Features

Automobile Industry Looks for Better Year

All signs point to a good year ahead for the automobile industry. Production, sales, employment, and capital outlay are all expected to rise, according to this year-end survey. Page 20.

New Parts Fabricating Method

A new plasma tool that handles ultra-hard metals by use of temperatures as high as 30,000 F is described here. Page 22.

Car Design Reflects Business Conditions

What effect has the recession had on new car design? Is buyer resistance to high prices responsible for the current de-emphasis of air suspension, fuel injection, higher horsepower? Some of the answers to these questions are given here. Page 23.

Detroit Diesel Offers Full Range of Engines

Detroit Diesel is now offering-for the first time in the industry-a complete line of Diesel engines for practically every application. Page 24.

Turin Automobile Show

The influence of Italian body stylists on the design of European and American makes was an outstanding feature of the Turin show. Page 28.

New Truck Transmission

A new truck transmission that eliminates the clutch pedal was demonstrated recently by Diamond T Motor Truck Co. For clutching, the driver presses a button on the gear shift lever. Page 29.

Stainless Steel on 1959 Cars

Use of stainless steel brightwork on 1959 cars is up about 15 per cent over last year. This survey examines current usage with an eye to the future of this bright metal. Page 30.

New Fisher Body Plant

Although the new Fisher Body plant embodies the latest production techniques, it is in reality a batch type operation-a job shop on a grand scale. Page 34.

CONTINUED NEXT PAGE



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Features • •

continued

Aircraft Hydraulics Conference

The latest developments in hydraulics systems for missiles and aircraft were outlined at the 1958 Aircraft Hydraulics Conference sponsored by Vickers, Inc. Page 37.

35 New Product Items And Other Features Such As:

Automation news report, news of the machinery industries, metals report; and industry statistics.

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CALENDAR

OF COMING SHOWS AND MEETINGS

- SAE Annual Meeting, Sheraton-Cadillac and Statler Hotels, Detroit, Mich. Jan. 12-16
- 49th Annual National Motor Boat Show, New York Coliseum, New York, N. Y. Jan. 16-25
- Chicago Automobile Show, International Amphitheatre, Chicago, III.Jan. 17-25
- American Society of Lubrication Engineers, First Annual Gear Symposium, Morrison Hotel, Chicago, III. Jan. 26-27
- Institute of Aeronautical Sciences, 27th annual meeting, Sheraton-Astor Hotel, New York, N. Y. Jan. 26-29
- Plant Maintenance & Engineering Show, Public Auditorium, Cleveland, O. Jan. 26-29
- Society of Plastics Engineers, 15th annual technical conference, Hotel Commodore, New York,
- 5th Annual Midwest Welding Conference, sponsored by Armour Research Foundation and Chicago Section of American Welding Society, at Illinois Institute of Technology, Chicago, Ill. Jan. 28-29
- First International Symposium on Nuclear Fuel Elements, sponsored by Columbia University and Sylvania-Corning Nuclear Corp., at Columbia University, New York, N. Y. Jan. 28-29
- Automotive Accessories Manufacturers of America, 32nd annual expesition, New York Coliseum, New York, N. Y. Feb. 2-5
- 14th Reinforced Plantics Division
 Conference, sponsored by Society of Plastics Industry, Inc.,
 Edgewater Beach Hotel, Chicago, III. Feb. 3-5
- Industrial Management Engineering Conference, Illinois Institute of Technology, Metallurgical and Chemical Engineering Bldg., 10 W. 33rd St., Chicago, III. . . . Feb. 5-6
- Amsterdam Automobile Show, Amsterdam, HollandFeb. 5-14
- Computer and Data Processing Conference, Dept. of Industrial Engineering, Purdue University, Purdue, Ind. Feb. 12-13
- Western Space Age Conference and Exhibit, Great Western Exhibit Center, Los Angeles, Calif. Mar. 5-7
- Steel Founders' Society of America, 58th annual meeting, Drake Hotel, Chicago, III. Mar. 9-10



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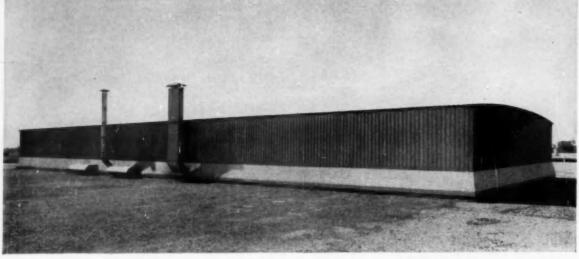
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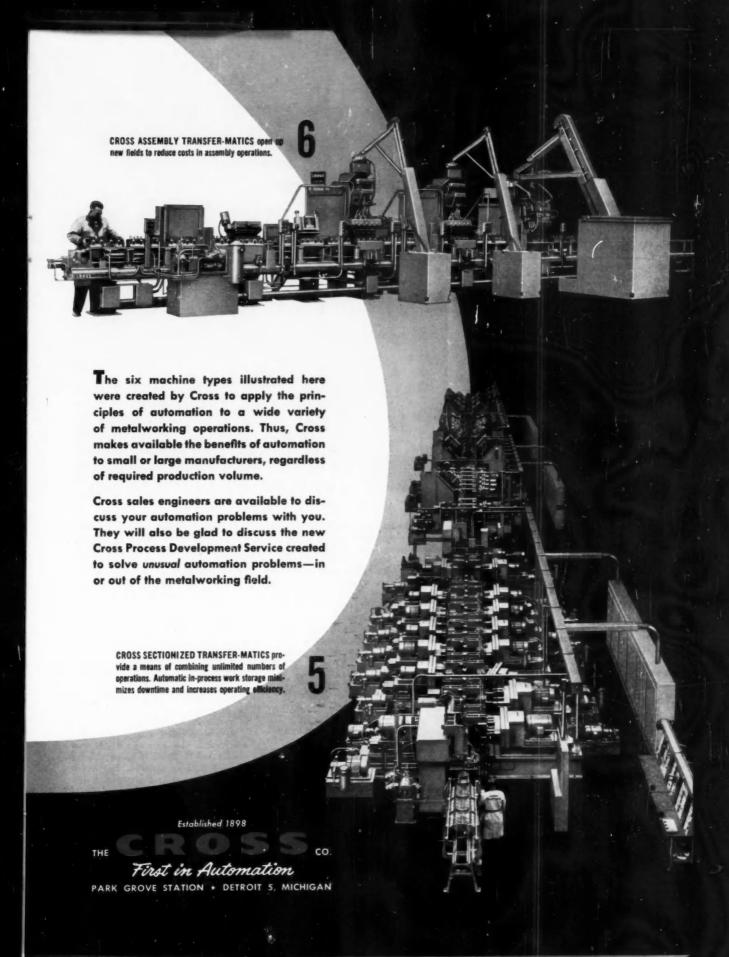
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News

OF THE AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 120, No. 1

January 1, 1959

Chrysler Div. Now Building 300E 'High Performance' Car

Chrysler Div. is now producing its 300E, fifth in a series of "high performance" cars.

The 300E will be the best performer of the lot, judging from division road tests and engine specifications.

Chrysler says the car has been tested at 0-30 mph in 3.4 seconds, and 0-60 mph in 8.3 seconds.

The 300E is powered by a V-8 with 413-cu in. displacement, twin four-barrel carburetors, and a horsepower rating of 380 at 5000 rpm.

The new engine delivers 450 lb/ft of torque at 3600 rpm and has a 10.1 to 1 compression ratio.

It also features a full race camshaft, special intake manifold, heavy duty valve springs and dampers, low restriction air cleaners, low back pressure exhaust system (on the twodoor hardtop) and speed limiting fluid fan drive.

AMC Will Spend \$10 Million To Boost Rambler Production

American Motors is spending about \$10 million to expand its Kenosha and Milwaukee automobile production facilities.

The money will go entirely to machine tools and other production equipment and is in addition to expenditures for tools and dies for 1960 model production.

Work began in December and most of the program is slated for completion next spring with the balance finished in time for '60 production.

The expansion will boost Rambler capacity to 440,000 units, according to AMC president George Romney. This is a 33 per cent increase.

For American Motors, the program represents a major policy change brought about by the success of the Rambler. Since formation of the corporation, contraction rather than expansion has been the watchword.



300E is fifth in series of high-performance cars

The former Hudson properties in Detroit were spun off; Ranco of Columbus, O., was sold; appliance production was centered in Grand Rapids just last November; automobile production was concentrated in Wisconsin. And during this period, no new expansion programs of any size were undertaken.

Current plans are based on an anticipated spurt in compact car sales of from 50 to 60 per cent of total market within 10 years. In fact, Romney predicts a 1959 small car market of one million units, including imports.

No new buildings are planned for the current project. Expansion is being comined to existing plants in Milwaukee and Kenosha.

In Milwaukee, a \$4.6 million program will cover additional welding equipment, expanded paint and trim line facilities. In Kenosha, a \$5.55 million program will boost six-cylinder engine capacity, rear axle and front suspension lines.

Romney revealed expansion plans to a meeting of the press and some 300 parts suppliers in Detroit. He said retail sales of 1959 model Ramblers are running at a rate of better than 300,000 units a year, and wholesale orders are "substantially higher."
Dealer orders on hand are higher than present production, he said, so the added capacity will be needed.

For the 1960 model year, Romney expects sales to be running at an annual rate of 400,000 cars.

In December, AMC plants were working two overtime shifts, six days a week. Weekly production topped 8000 units. A further production rise was slated for January. Employment in the three Wisconsin automobile plants on Dec. 1 was 7400 higher than a year ago.

With added capacity, AMC hopes to cut back on the overtime schedules so that cost-per-unit can be cut.

November retail sales totaled 21,-894, double the year-ago figure and second best in Rambler history. Sales in the first two months of the current fiscal (and model) year totaled 48,-642 units.

Chrysler-UAW Pact Ends Strike At Dodge Main Parts Plant

As this issue went to press, Chrysler Corp. workers returned to their jobs after negotiators for the company and the UAW reached an agree-



TEST RIG SIMULATES CHANGING ROAD CONDITIONS

Suspension test rig uses drums with attachable surface irregularities to simulate different road conditions. Rollers are mounted on a truck axle driven through a fivespeed gearbox by an electric motor. One set of wheels is anchored to the platform and the other pair is driven. The rig was developed by Van Doorne's Automobielfabriek, Holland, makers of the DAF car.

ment to end an 18-day strike.

The strike at four Dodge plants virtually crippled Chrysler Corp. production by cutting off parts supplies to nearly all corporation assembly plants.

The agreement included a "memorandum of understanding," on how to handle work standards disputes, and it is believed that this will prevent strikes such as have plagued Chrysler over the past year.

The walkout, which began Dec. 2 at Dodge Main and three parts plants in Detroit, was the first real test of the automobile industry's new three-year labor contracts.

Although only one UAW local was involved, the strike had the impact of a general corporation strike. Nearly 44,000 workers were idled just a few days before Christmas. By that time, 29 plants in the U.S. and Canada were closed.

All assembly plants except Imperial and Dodge Truck were down the week before Christmas, and these two were working on a day to day basis. The Chrysler Div. Jefferson plant and the Plymouth Detroit plant were forced to close Dec. 8, the Los Angeles and Evansville plants the following day, and the Delaware plant Dec. 9.

An old Chrysler bugaboo, work standards, was the issue. Last point confronting negotiators involved relief time for 400 workers in the bodyin-white department. Chrysler wanted to shorten relief periods to bring them in line with other comparable departments within the corporation and with competition.

Actually, it was the second time Chrysler production was halted since the master agreement was signed with the UAW. The master agreement did not cover UAW office workers, who held a strike of their own in November and subsequently closed down assembly plants.

Ford Claims Early Sales Lead, But Trails in Car Production

Ford claimed an early lead in its annual battle with Chevrolet for sales supremacy, while Chevrolet was establishing new production peaks.

Ford Div. quoted registration figures from R. L. Polk & Co. to show an early advantage over traditional rival Chevrolet. Ford registered 71,-656 passenger cars during October, an estimated 3 per cent higher than Chevrolet.

But Chevrolet was building cars at a record-breaking clip. In the second week of December, the division built a total of 54,268 cars and trucks, including 45,305 cars. This broke Chevrolet's own weekly production record of 44,920 cars built in the corresponding week a year ago, and 53,630 total vehicles assembled the week ended Nov. 23, 1957.

Ford's October registration advantage was gained during a month when Chevrolet production was curtailed by strikes. Chevrolet did not get production into full swing until November and December.

But Ford said its October lead was increased in November, and that the final 10 days of November the daily sales were the highest of the year. Ford said it sold 108,000 cars in November.

Meanwhile, Chevrolet planned to continue its high production rate for the balance of December, with sixday weeks at all assembly plants for the week before Christmas.

Another GM division, Cadillac, had its best production week in history for the week ended Dec. 13. Working six days, Cadillac built 4413 cars, passing the two-year-old record of 4337 units.

Production for 1958, incidentally, tapered off slightly during December as Chrysler assembly plants were strike-bound.

How Successful Is the Lark? S-P Makes Money in Quarter

The success of Studebaker-Packard's new Lark can best be seen in one significant fact: the company reported profits for October and November, with an anticipated profit for the month of December.

It's been a long time since Stude-baker-Packard was in the black. But now the company can claim a small but timely victory. President Harold E. Churchill says the financial picture is the result of volume sales of the Lark plus the company's other cars and trucks.

Churchill says the retail sales of Studebaker cars for the 30 days immediately following introduction of the Lark were the best since June, 1955. This, he added, came during a period of limited supply of Lark automobiles.

But steps have been taken to improve the supply situation. S-P started out the model year Nov. 14 with a production rate of 54 cars an hour on a 40-hour week. This was boosted Oct. 20 when the week was expanded to 53 hours, and then the hourly rate was increased to 60 units Nov. 20.

A further production boost was scheduled for Dec. 29, with the hourly rate increased to 70 vehicles.

Churchill said many dealers were "several weeks" behind in deliveries, and there was a substantial backlog of dealer orders.

NEWS AUTOMOTIVE



THREE-WHEEL "SURREY"

A three-wheel convertible passenger vehicle, called Surrey, built by Lambretta with body by Ghia is being marbretta deslers in this country. Surrey is powered by a single-cylinder, two-cycle engine. It is operated from partially enclosed room wicker rear seat. Canvas roof is standard equipment.

One of the latest developments, which will show up in 1959 sales figures, is the introduction of a new callulosic rayon cord called Tyrex. Nearly all of the 1959 model cars offer Tyrex-reinforced tires, and all of the four leading tire companies are using Tyrex cord.

Tyrex probably got its biggest boost.

Tyrex probably got its biggest boost when Chevrolet decided to ride with the improved rayon cord instead of nylon this year. Chevrolet general manager, E. N. Cole, has called Tyrex cord tires the "best we know to put on the car, bar none."

Mack Develops New Cooling System for Transit Buses

Mack Trucks, Inc., announced it has developed a new air-conditioning system for transit buses that eliminates hot and cold areas and keeps windows fog and frost-free.

Harold R. Fouss, Mack Bus Div. sales manager, said the new system is an integral part of the bus, unlike other cooling units. Conditioned air is brought into the passenger compartment through outlets just below the windows and through a damper-controlled opening up front for the driver. Another advantage is that the compressor system is driven directly from the Mack Thermodyne Diesel engine.

The new system is available on all Mack transit buses, the company said.

Engineer Says Turbine Cars May Be in Production by '65

A University of Michigan engineer, Prof. Frank L. Schwartz, says that the gas turbine powered automobile may be mass produced by 1965.

Schwartz points out that economic factors are narrowing the gap between the turbine and the reciprocating engine. Competition becomes keener with every increase in horse-power, and with larger air filters, costly fuel injection systems, and engine designs requiring higher octane fuels.

Turbine cars will probably be powered by a 200-hp engine no larger than present units, according to Schwartz. Maintenance probably would be less than on piston engines, and turbines would use less oil and no antifreeze.

Schwartz says such a turbine probably would appear first in the lowpriced cars as a production unit.

Tire Makers Optimistic About Sales During 1959

The rubber industry is looking toward a 10 per cent increase in tire sales during 1959.

The industry expects to end 1958 with total sales of slightly more than 100 million units. This includes both original and replacement sales of passenger car, truck, bus, farm equipment and other motor vehicle tires.

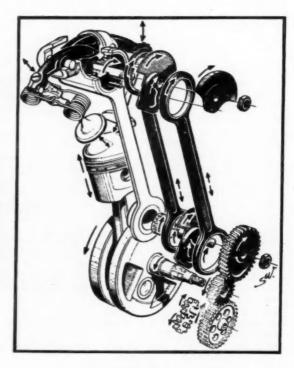
Russell DeYoung, president of Goodyear Tire & Rubber Co., said recently that replacement sales this year should total 70 million tires, a new high, and should go up another two or three million next year.

Original equipment tire sales have been running low this year because of the drop in automobile sales.

Passenger car replacement sales are expected to top by nearly three million the record high of 56.6 million units sold in 1957, therefore, should end up at about 82.5 million units for 1958.

NSU PRINZ

NSU of Neckarsulm. Germany, has revived the system of eccentries and oscillating connecting rods to drive the overhead camshaft of its twocylinder engine power ing the Prinz car. This method provides posi-tive operation of the shaft and rocker arms, and maintains constant adjustment regardless of engine temperature. Lighter valve springs can be used, reducing power dissipation. Mechanism is housed within the cylinder block, and is claimed to be virtually noiseless and to minimize wear due to the large bearing surfaces.



Vacuum Metallizing Makes Gains in Some Automobile Applications

Vacuum metallizing is continuing to make small inroads in automobile trim applications. Indications are, however, that future growth might be in the direction of functional rather than decorative use.

One of the major new uses on 1959 automobiles is in molded plastic arm rest bases, with vacuum coated finish to add shine. Pontiac is using arm rests of this type, and other GM cars might make the switch later in the model year.

With clear acrylic plastic like methacrylate as a substrate, the manufacturer can use vacuum coating to apply to the speedometer face and other instrument panel lettering and eliminate entirely the need for glass. The saving comes in the reduction of the number of parts and the elimination of assembly.

Meanwhile, the number of trim applications such as horn buttons, exterior script, grille insignia and other colored items is increasing, according to Dr. Lee B. Storms, research director for Red Spot Paint Co. of Evansville, Ind. Reaspot is a major supplier of both the prime and top coating for vacuum metallizing processes.

As Dr. Storms pointed out, much of the vacuum coating work is done by small parts suppliers, although



CHINESE REDS TO PRODUCE PICKUP TRUCK

The Chenteng 1.5-ton pickup truck, designed in Communist China, is slated for production in Shanghai in the near future. Reds are reported to have built experimentally 100 types of road vehicles and 200 varieties of tractors since the beginning of the year. Planned output of existing models in 1958 is 20,000 trucks and cars and 40,000 tractors.

the automobile manufacturers themselves are getting further into the technique. Ford, American Motors, and Inland Manufacturing Div. of GM are active in the field.

One growth area could be in the use of vacuum coating for printed circuits, resistors and condensers.

Aluminum Engines Safer, Alcoa Engineer Says

Aluminum engines can make tomorrow's car safer and less costly to run.

James M. Smith, manager of the engine section of Aluminum Co. of America's Cleveland development division, told the Chemical Specialties Manufacturing Association that aluminum engines may reduce total car weight by as much as 200 lb.

"Naturally, a lighter car is easier to stop," he said, "and easier to start. All this makes for economy of operation. A reduced braking distance can add a great deal to the safety factor of today's cars," he added.

Smith said that Alcoa has built and tested several experimental all-aluminum engines. It has also tested an engine using an aluminum head on an iron block. "We found that this engine will run cooler than the all-iron unit," Smith said, "and can use a lower octane gasoline for the same compression ratio."

Better weight distribution, plus easier steering are other advantages to be gained through use of lightweight aluminum, Smith said.

Five-Day Program Outlined For SAE 1959 Annual Meeting

A five-day program covering subjects ranging from V-type diesels and fuel volatility to structural glass has been outlined for the 1959 annual



BERKELEY SPORTS CAR HAS DETACHABLE HARDTOP

This small four-passenger sports car with detachable hardtop is built by Berkeley Cars, Ltd. of England. Known as the Foursome, this model is powered by a three-cylinder engine with a displacement of 30.02 cu in that develops 30 bhp at 5500 rpm. Compression ratio is 7.5 to 1. The Foursome features a detachable fiberglas hardtop, which is available as an option. Car is built on a 78-in. wheelbase, has an overall length of 131 in., overall width, 54 in., and overall height, 46 in.

meeting of the Society of Automotive Engineers, Jan. 12-16 in Detroit.

Some 120 exhibitors have planned engineering displays on everything from drive line components materials to controls and engine developments.

Goodyear VP Sees Good Year For Car Accessory Dealers

There's a good year ahead for automobile tire, battery and accessory dealers, with the possibility of the highest dollar volume in history. That's the prediction of Victor Holt, Jr., executive vice-president of Goodyear Tire & Rubber Co.

Holt foresees replacement tire sales of more than 72 million units; a 25 to 30 per cent rise in the demand for tires and other rubber products by the automobile industry; an increase in total tire production to 111 million units; and a boost in rubber consumption from 1,325,000 tons this year to 1.5 million tons in 1959.

Holt says his company's business research department has forecast a record high in 1959 for replacement battery sales.

Hoover Ball & Bearing Co. Purchases Two Concerns

Hoover Ball & Bearing Co. has purchased two firms which will add about 15 per cent to Hoover's ball bearing production capacity. The two dompanies, Strom Ball Co. of Erwin, Tenn., and Coolidge Corp. of Middleton, O., will operate as separate firms with no change in management.

Hoover chairman C. H. Simmons, in announcing the acquisitions, said the move will lead to worthwhile economies in manufacturing costs.

ASTE Lists Dates, Places For Technical Seminars

The American Society of Tool Engineers lists the dates and locations for its upcoming series of "Creative Manufacturing Seminars." The series begins with Plastic Tooling for Production Jan. 28 in San Francisco and Jan. 30 in Los Angeles.

The schedule will wind up with a seminar on Planning for Profit April 20-21 in Milwaukee.

Other meetings will be Tooling for Metal Powder Parts Feb. 4, Philadelphia; March 31, Chicago; and April 28, San Francisco; Analysis of Metal Cutting Methods, March 11-12, Hartford, Conn.; and April 9-10, Philadelphia; Optical Tooling and Gaging in Manufacturing, May 6, St. Louis; and Numerical Control of Machine Tools, Feb. 17, Detroit.



Iochrome, an ultra high-purity chromium developed at Battelle Memorial Institute, is now available from Chromalloy Corp. Iochrome is claimed to have more ductility than any other chromium. Tensile tests on wrought material from an arc-cast Iochrome ingot revealed a 44 per cent elongation and 78 per cent reduction in area, the company said.

American Brake Shoe Co. is building a \$2 million research center in Columbus, O., to be known as Hydrodynamics Research Center. The new center, which will be operated by the Denison Engineering Div., will launch advanced systems research in hydraulics, electronics, and pneumatics.

. . .

A new radioisotope source, which emits low-energy radiation, is being used experimentally for industrial radiography. Developed by General Motors Research Laboratories, the new source—designated Samarium-153 — is particularly suitable for use with thin aluminum and steel sections which cannot be radiographed with cobalt, cesium, and irdium or thulium sources now on the market, GM reported.

A new British storage battery combines the plugs for the six cells in a single venting manifold to simplify inspection and adding of water. Cells breath through the continuous duct in the clip-on hollow bar which gives an enlarged gassing area and cuts acid loss.

The Vauxhall (GM) factory in England is using open-circuit TV to study suspension units, shock absorbers, propeller shafts, and other "hard to see" components, while they are being punished on the firm's test track. A miniature camera, together with a flood light, is carried on a frame in front of the car. A small transmitter sends the picture to the nearby research laboratory, where a receiver supplies engineers with accurate and controlled information.

Mobay Chemical Co. increased its facilities for manufacture of basic urethane chemicals by 50 per cent at its New Martinsville, W. Va., plant. Young Spring & Wire Corp. will open a new 66,000 sq ft plant in Archbold, O., sometime this month. Principal product of the new facility will be padding supports used in automobile seats.

Wisconsin Motor Corp., a major builder of air-cooled internal combustion engines, is constructing a 15,000-sq ft engineering building adjacent to its Plant No. 1 in Milwaukee.

New York Air Brake Co. formed a new foundry division that is expected to assume an active position in the commercial castings field. The new division will take over the firm's foundry facilities at Watertown, N. Y.

Two new plating systems that improve corrosion resistance of zinc die castings are being investigated at Battelle Memorial Institute. One is a composite coppernickel-chromium system in which 0.000025 in. of chromium is deposited in a crack-free and porefree coating and applied over the customary thickness of copper and nickel. The other consists of two layers of nickel electrodeposited in different baths.

AC Spark Plug Div. of General Motors developed a lightweight version of the inertial guidance system it is now producing for the Thor missile. The unit, which has already reached the preproduction prototype stage, will weigh somewhere between 100 and 200 lb, compared with 500 to 1000 lb for the Thor guidance system.

Quartz is now being grown in crystals on a commercial scale by Bell Telephone Laboratories and Western Electric Co. The crystals, which are essential for radar and electronic systems, are made by subjecting ordinary sand or unusable quartz to pressures above 15,000 psi in special chambers.

Snyder Tool & Engineering Co. changed its name to Snyder Corp.

Dana Corp. and Aircraft Armaments, Inc. agreed to team up to develop and produce military equipment.

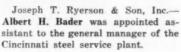
MEN

IN THE NEWS



8

Federal - Mogul -Bower Bearings, Inc., Federal - Mogul Div.— Thomas J. Marshall has been promoted to sales manager.



Fisher Body Div., General Motors Corp.—John Schachinger, Jr., was made assistant chief engineer of body engineering, and Stanley F. Kramer succeeds him as assistant director of production engineering.

Schwitzer Corp.—George C. Brainard, Jr., has been appointed assistant to the president.

General Electric Co. — J. Robert Walcott has become manager of manufacturing for the Atomic Power Equipment Dept.

Ford Div., Ford Motor Co.—G. B. Price was named executive assistant to the general manager.

Allis-Chalmers Mfg. Co. — S. B. Lamica was appointed manager of the Jacksonville (Fla.) district of the Industries Group.

American Chain & Cable Co., Inc., American Chain Div.—Thomas R. Gerosky was named district sales manager for the Chicago territory.

General Motors Corp. — John J. Ahern was appointed director of security and Kenneth C. Dick director of GM Photographic.

Standard Oil Co. (Indiana)— Charles E. Anderson was named manager of the purchasing planning division.



Torrington Co. — Milton E. Berglund was elected president, succeeding Walter C. Thompson, who was named chairman of the board.



S.W.

Lipe-Rollway Corp.—John D. Williams was elected president, succeeding H. Follett Hodgkins, Sr., who becomes chairman of the board.

Chrsyler Corp.—William C. Hanway, Jr., was named Dodge truck sales manager; Roger Welch, administrative assistant to the general sales manager; E. M. Braden, director of Chrysler-Imperial sales; and William Kough, director of Central Area.

Browne & Sharpe Mfg. Co., Cutting Tool Div.—Colin Sharp was made West Coast manager.

Consolidated Electrodynamics Corp., Electro Mechanical Instrument Div.— John P. Moffat, Jr., was named chief engineer.

International Harvester Co.—H. A. Torgersen has been appointed manager of the Fort Wayne Works.

Cleveland Cap Screw Co.—Thomas A. Fribley was elected executive vicepresident, and Robert E. Thomas was named vice-president in charge of sales.

New York Air Brake Co., Hydreco Div.—Robert E. Schwary was named manager of engineering.

Electric Storage Battery Co., Exide Industrial Div.—C. J. Moore has been appointed general sales and marketing manager.

Chevrolet Motor Div., General Motors Corp.—Richard E. O'Brien was made an assistant national sales promotion manager.

Firestone Tire & Rubber Co.—James J. Robson has been named director of tire engineering and development.



Rockwell - Standard Corp. — Vincent E. Gumbleton was appointed vice-president and purchasing coordinator.



Curtiss-Wright Corp. — Edward Bachor has been appointed assistant chief engineer of the Electronics Div.

ACF Industries, Inc.—Henry A. Correa was elected vice-president of marketing.

Borg-Warner Corp., York Div.— T. J. Ammel has been named sales manager, O.E.M. Products.

Eaton Mfg. Co., Saginaw Div.— Melvin L. Zuehlke has been named assistant general manager.

Pangborn Corp.—Leonard W. Wagner was appointed Augusta, Ga., district manager.

New York Air Brake Co., Hydreco Div.—Robert F. Hodgson was made general sales manager.

American Bosch Arma Corp.—John L. Taggart has become director of marketing, with primary responsibilities in defense programs.

Necrology

Wilson S. Isherwood, 77, retired general sales manager of AC Spark Plug Div. of General Motors, died Dec. 8, at Bradenton, Fla.

Harold V. Coes, 75, a former president of the American Society of Mechanical Engineers, died Dec. 4, at Glen Ridge, N. J.

James Toussaint, 67, former vice-president and comptroller of Fulton Co., died Nov. 26, at Milwaukee, Wis.

Kenneth P. Hayes, 58, service parts manager of the Transmission and Axle Div. of Rockwell-Standard Corp., died Nov. 20, at Detroit, Mich.

AVIATION MANUFACTURING







PROPELLO-PLANE

The X-18 Propelloplane, a tilt-wing research transport, was unveiled recently at Moffett rield, Calif. Built by Hiliar Air-craft Corp. for the Air Force, the X-18 can operate as a VTOL, an STOL (short take-off and landing) or a conventional airplane, depending on the length of the run-way. The twin-engined turboprop X-18 de-velops a total of 11,-070 eshp. Sequenced photos illustrate the wing tilting operation of the aircraft.

Latest predictions are that the Minuteman may be ready for use in 1962. If it can be used as a single stage, two-stage, or three-stage weapon, it could fill most land-based strategic missile needs.

Bendix, Goodyear Receive Contracts for Missile Work

Bendix Aviation Corp. and Goodyear Aircraft Corp. have won new contracts for guided missiles work. The Bendix contract, from the Navy. is for design and development of a new long range air-to-air missile called the Eagle.

Bendix is prime contractor on the Eagle and the contract is believed to total more than \$100 million. Airframe for the Eagle will be built by Grumman Aircraft Engineering Corp. at Bethpage, N. Y. Bendix won over 16 competing design bidders.

Development and production work will be done at Bendix Systems Div. in Ann Arbor, Michigan, Pacific Div. in North Hollywood, Calif., and research laboratories in Detroit.

The Eagle will be a high-performance missile launched from a "relativel slow" aircraft. According to Rear Adm. R. E. Dickson, Chief of the Naval Bureau of Aeronautics, the Eagle will be used for fleet air defense or intercept missions.

Adm. Dickson says the Eagle concept has been under study for three years and represents a new trend in guided missiles thinking. High performance is built into the missile rather than the aircraft, and the missile is believed to have a range of better than five miles.

Goodyear Aircraft Corp., a subsidiary of Goodyear Tire & Rubber Co., received a \$1.7 million contract from the Air Force for ATRAN nose sections and spares for the TM-76A Mace surface-to-surface missile.

The Goodyear contract was part of a larger contract that will run to an estimated \$38 million, according to an Air Materiel Command spokesman.

Air Force Cancels Goose **Decoy Missile Program**

The Goose is a gone gosling. Dropping of this device from the Air Force missile program leaves only the Quail as a strategic decoy missile.

Ditching of the Goose project was hinted early in December, when the

Rocketdyne Wins Bid To Design 1.5 Million Lb Thrust Rocket

Rocketdyne Div. of North American Aviation, Inc. has been picked to design and develop a rocket engine with a thrust of from 1 to 1.5 million

The National Aeronautics and Space Administration chose Rocketdyne over five other firms that submitted proposals for the high-thrust engine. Negotiations for a formal contract with Rocketdyne will start early this month.

T. Keith Glennan, NASA administrator, said the program will cost more than \$200 million and may take from four to six years to complete.

NASA officials said the engine would be a liquid bi-propellant, single chamber, booster rocket of 1 million lb nominal thrust, capable of being developed to 1.5 million lb thrust. It will use liquid oxygen and hydrocarbon propellants, but will easily be adaptable for other liquids.

Pentagon May Decide Soon On Basic Strategic Missile

An early decision on whether the U. S. will switch to a single type of stratetic ballis ic missile is expected from the Pentagon.

Military chiefs are showing signs that they now may base their globalwar planning on just those missiles of intercontinental range. A switch to production of those missiles solely, with a phase-out of IRBMs, is hinted currently.

Results of Defense Secretary Mc-Elroy's recent trip to Western European countries will influence the decision. If Europeans opposed use of their territory for numerous IRBM launching sites, the Thor and Jupiter may have a limited production life.

The Defense Dept. and other agencies may choose to rely on ICBMs alone after 1960. The IRBMs now under contract will be produced and delivered, but no new orders would be placed.

A shift to missiles with ranges of at least 5000 miles would leave the Defense Dept. with a selection of Atlas, Titan, or Minuteman. The Atlas-recently tested successfully on a 6300-mile flight-apparently is the best bet for early volume production. But the Minuteman, last of the three placed under development, may be the eventual choice as the basic strategic missile.

Air Force stopped work on launching bases for the missile in Vermont and Minnesota.

Altered operational planning is the stated reason for cancelling the missile itself. Fairchild Engine & Airplane Corp. was developing the Goose. An estimated \$15 million had been spent for this work.

Even the Quail, under development by McDonnell Aircraft Co., may not figure in Air Force plans much longer. There are signs that the planners intend to drop any flying device that doesn't provide a bang. The decoys, though well conceived, now are considered luxuries, not necessities.

The Defense Dept. said no decision has been made about the future of the J-83 engine, which was also under development by Fairchild for use in the Goose as well as other missile programs.

Battle of Jetliners Enters Second Round

The battle for jetliner business still goes on among West Coast aircraft manufacturers. Boeing won the first round by getting more orders for its 707 than Douglas got for its DC-8.

Now it looks as if another round is shaping up.

Both companies are asking the airlines if they are interested in smaller versions of the big ships. Douglas is proposing a medium-range jetliner and Boeing is thinking along the same lines.

Meanwhile, Convair is planning its 600 jetliner. The company says it's a "second generation" to the Douglas DC-8, the Boeing 707, and its own 880.

Piper Aircraft to Produce New Agricultural Airplane

Piper Aircraft Corp. announced it will produce a new low-wing agricultural airplane at its Lock Haven, Pa. plant. Production will start on a limited basis in the first quarter of 1959.

The new plane, called the Pawnee, is the first production aircraft to come out of Piper's research and development center at Vero Beach, Fla.

The Pawnee is powered by a 150-hp Lycoming engine. It has a gross weight of 2300 lb, useful load of 1100 lb, and a hopper capacity of 110 gal of liquids or 20-cu ft of solids. The pilot's cockpit has been placed as far aft and as high as possible for maximum safety and visibility.



VIGILANTE UNDERGOING FLIGHT TESTS

Latest flight views of A3J Vigilante show plane undergoing flight tests in California. The A3J, a Navy attack plane designed and built by North American Aviation, Inc., is powered by two General Electric J79-2 engines, each with 15,000-lb thrust.

The Pawnee is designed for operation from short, rough fields close to the operating area. Its performance characteristics are very much like those of the Piper PA-18-A agricultural airplane, which the Pawnee is designed to replace.

Bell Aircraft Develops New Plane Landing System

A new automatic landing system said to be capable of landing 120 planes an hour has been developed by Bell Aircraft Corp.

The system uses radar to track an airplane and supply position information to an electronic computer. The flight path of the plane is compared with the desired flight path, and a correction signal is sent by radio to the plane's autopilot.

The autopilot controls the aircraft until visual reference is established or to actual touchdown.

The Bell system can easily be adapted to any airplane equipped with standard Instrument Landing Systems, Bell engineers said.

Sikorsky Gets Navy Contract To Produce HSS-2 Helicopters

Sikorsky Aircraft Div. of United Aircraft Corp. was awarded a \$17 million contract for production of HSS-2 helicopters, the Navy announced.

The production order follows \$15 million in initial contracts for the new helicopter awarded Sikorsky by the Navy over the past year.

The HSS-2 will be powered by two General Electric T-58 turbine engines mounted side by side above the fuselage.

The helicopter, which is being produced at Sikorsky's Stratford, Conn., plant, has a flying boat hull and all-weather capabilities. It represents, the Navy said, a substantial advance over the HSS-1, now used by the Navy in anti-submarine operations and by the Army and Marine Corps for utility work.

A Marine Corps version of the HSS-2, fitted with cargo sling and rescue hoist, is to be used as a troop carrier.

New Duct Stand Proposed For Nuclear Rocket Tests

A duct-type test stand may be used in future nuclear rocket engine testing, according to Sidney G. Rumbold, Aerojet-General Corp. engineer.

The test stand would be built on top of a hill or cliff site and the engine fired in a vertical flight position. Exhaust gases would travel down from the rocket engine nozzle through a water-cooled aluminum duct to the base of the hill. Test equipment, instruments, and coolant controls would be in buildings next to the test assembly.

Rumbold spoke before the American Rocket Society's annual meeting in New York City.

Another design that may be feasible is a modified J-shaped deflector test stand, Rumbold said. The modifications would include sides to contain the gases and shielding around the reactor to protect it from the effects of heated gases.

HE automobile industry is looking optimistically toward 1959, and on the heels of a rather disappointing 1958, such optimism is entirely understandable. But the optimism prevalent in Detroit is not merely a reaction to the "down" stroke of a cycle. It is a genuine, well-founded optimism based on solid economic indicators which point to a good year in production, sales, employment, capital outlay and research.

Upturn in Sales

It is not unrealistic to expect total industry production and domestic sales of 5,500,000 passeneger cars and 900,000 trucks and commercial vehicles during the coming year. Automobile manufacturers are formulating their 12-month plans with these general figures in mind. Sales of foreign cars in this country will show a slight increase, although not at the same rate as during the past year, and they should level off at around 400,000 units. Exports are not expected to rise, chiefly because of the growing availability of European-built cars in other areas of the world. With an upturn in sales and a three-year labor contract in pocket, employment in the automobile and related industries should hold steady throughout the year. And with a "big change" year coming in 1960, capital outlay by the industry for tooling will be heavier during 1959. Research should continue at an accelerated pace, particularly in metallurgy and powerplants.

Automobile Industry Heads Into Better Year

By Hugh Quinn

Two important factors have aided industry economists in predicting an improvement in 1959. One is the new car order and production ratio as the year begins indicating strong production during the early months of 1959 with momentum to carry farther into the year. The other is the fact that the adverse circumstances which worked against the industry during 1958 will not be around during the new year.

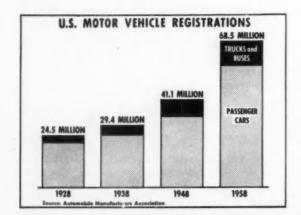
Depressing Factors in '58

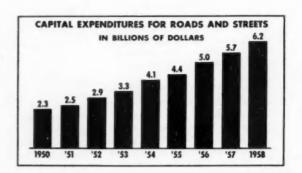
But two events of 1958 dealt the automobile industry serious blows. One, as is well known, was the recession. The other was the labor strife and subsequent production difficulties during the summer and fall months. But both of these events can be considered history, and 1959 should be free of either shadow.

The recession hit the United States and the automobile industry

early in the year, although it is generally agreed that the industry did not feel the real pinch until the recession was well under way. But once the automobile plant cities were caught in the vise of production cutbacks and reduced employment, the pinch became a hard squeeze. The reason is fairly clear: an automobile is a major purchase item and takes a good chunk out of the average family income. Therefore, in a year of recession it is a matter of simple family economics to delay buying a new car. And as a result, automobile production and factory sales fell by about 30 per

Production, in fact, totaled approximately 4,300,000 passenger cars and less than 900,000 trucks and commercial vehicles. Wholesale value of the industry's output was an estimated \$9.75 billion, a drop of approximately \$3.5 billion from the previous year. Employment in motor vehicles manufacturing industries averaged only 495,000 production workers, a decrease of about 135,000 workers from the previous year. Payroll for produc-





tion workers, as a result, dropped by \$600 million during 1958, according to Automobile Manufacturers Association statistics.

Higher Demand for Parts

On the encouraging side, however, the wholesale value of replacement parts and accessories rose slightly to \$2.1 billion, an increase of \$60 million over 1957. Total registrations increased from 55.9 million passenger cars and 11.2 million trucks and buses to approximately 57 million cars and 11.47 million trucks and buses.

But economists agree that the recession is behind us, and business in general is showing a definite upturn. The phrase "bottoming out" became commonplace in recession conversation during the latter months of 1958. Automobile companies reported increases in sales even before new model time, and enthusiastic acceptance of the 1959 offerings led company prognosticators to adjust their forecasts upwards in several cases. As 1958 drew to a close, every car manufacturer was working overtime to produce enough cars to satisfy dealer demands. This will keep plants extra busy.

So the recession—and the equally harmful talk of gloom that accompanied it—will not be around to hamper sales during 1959. In fact, the people who put off their new car purchases during 1958 should be eager to jump back into the market during the coming year.

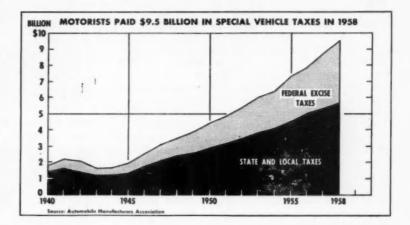
Labor Trouble

The second major problem of 1958, the labor negotiations and subsequent companywide strikes, should not interrupt production during the new year. There are bound to be brief work stoppages and wildcat strikes at local levels, but no prolonged major tie-ups such as the ones experienced by Chrysler Corp., General Motors and several of the supplier companies.

The new labor peace is important. It gives the automobile companies an opportunity to schedule plants and production lines with the reasonable assurance that schedules will be met. It gives cost analysts

the opportunity to protract labor costs over a long base period. Not to be overlooked, it provides an aura of security to the work force in the plants, where a man's attitude is important to the final quality of the product. And it provides a stability to the labor force in the gigantic automotive industries, where every employed man is a potential customer for car companies.

dealer orders already have mounted to 50,000, and the South Bend plant was working overtime to catch up. The Lark has a low original price and should be economical to operate. So confident is S-P in the success of the Lark that the company agreed to grant wage increases as wholesale sales pass certain levels. Then S-P made arrangements to grant the entire amount of the increase in December, in anticipation



Questions To Be Answered

The coming year will pose some interesting questions and perhaps will provide the answers as well. Questions such as: How successful will be Studebaker-Packard's attempt to remain a factor in the automobile manufacturing business? Will Rambler, now in its fourth year with the same basic automobile, be able to maintain the fast pace set during 1958? Will Ford's "classic simplicity" of design stand up to the more radical styling change of Chevrolet?

Will Plymouth increase its sales enough to carry Chrysler Corp., as Ford Div. now carries its parent company? How far will GM's new styling boost that corporation's aggregate sales? How will Edsel fare in its second year? And what about the "small car"?

The Lark will be a relative success, compared with S-P products of recent years. Early orders have indicated a good year. By Dec. 1 of sales of at least 90,000 cars.

Rambler is swinging into 1959 with sales and production setting all kinds of records. AMC, in fact, stopped sending out press releases on its 10-day sales reports because each report seemed to be a new record of some sort, and all the press releases read alike. The 100-in. Rambler American accounted for some 25 per cent of sales of early '59's. But there was talk of plant expansion during 1959 as the company continued to increase its production schedules almost to the maximum.

Ford is banking on a consumer rejection of Chevrolet's more radical styling change. Ford's 1959 product retains many of the basic lines of the '58 car, but with some definite improvement. Early sales reports from Ford Div. indicated good acceptance of the new products.

Plymouth, of all the Chrysler (Turn to page 42, please)

New Parts Fabricating Method Uses Heat up to 30,000 F

A RADICALLY new method for fabricating shapes and applying coatings that will withstand temperatures above 5000 F has been announced by the Linde Co., Div. of Union Carbide Corp.

The process harnesses controlled temperatures of up to 30,000 F and makes possible the fast and accurate production of ultra-hard materials that have been virtually unworkable in the past.

The key to the method is the Linde-patented Plasma arc torch, a small device less than two inches in diameter that can melt extremely hard materials without being consumed by the intense heat it generates.

The metal or substance to be worked is prepared in either powder or wire form and is then passed through an intense arc that is struck inside the torch. It is at this point that the temperatures above 15,000 F are reached.

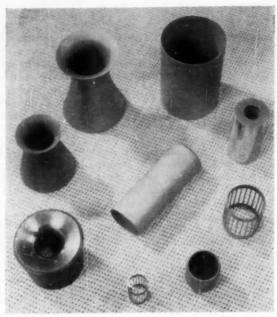
Because of the intense heat of the arc, the material passing through is converted into a fluid or plastic state. It is then carried out of the torch by inert gases flowing at high velocity and is deposited on the part being made or plated with such force that a firm bond results.

Parts are made by first preparing a mandrel to the precise internal dimensions of the part to be made. While the mandrel is rotated, the torch applies the selected material as it moves back and forth over the mandrel, maintaining a 90 deg angle to the surface being coated. When the proper thickness has been reached, the torch is stopped and the mandrel is leached out. Brass is often used and then dissolved in nitric acid. Where acid would attack the coating material, an aluminum mandrel is used and then leached out with caustic.

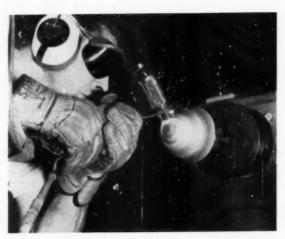
Once made, parts are given a moderate heat treatment to improve density and other physical properties. They may or may not require additional polishing or grinding, depending on their application.

In addition to experimental rocket and missile parts of pure tungsten or tungsten-coated graphite, the torch has been used to produce high-density tungsten crucibles for metallurgical purposes, special parts for nuclear work, sensitive electrical contacts, and electronic components and x-ray targets of superior density. Pure tungsten, molybdenum, zirconium, and tantalum—all metals in the highest temperature range—the hard carbide materials, and precious metals, including platinum and palladium, have all been used successfully.

Although the Plasma torch is a new development in the fabrication field, it has been used for some time



Linde torch can be used to fabricate many types of parts



Plasma are torch used for coating nose cone with tungsten

in advanced research. Set up as a wind tunnel for either large or small units, the plasma arc can simulate speeds up to Mach 20 and reproduce conditions which a missile would encounter when it re-enters the earth's atmosphere.

In a different field, the torch can be significant in determining the physical changes that take place when solids, liquids, or certain types of gases are passed through the heat of the arc. Studies bearing on the use of high-temperature torches for promoting unusual chemical reactions are being investigated. This development is also expected to contribute to the knowledge of high-temperature furnaces.

Linde does not plan to market any of this equipment at the present time but the company is prepared to accept orders for parts coating or metal fabrication, either in production or in experimental quantities.

HE effect of the recession on the automotive industries was serious in many ways. Besides the loss of revenue, the lag in buying together with the impact of criticism of car design by all manner of lay experts, resulted in many moves that might not have been made if business had boomed.

One of the results was an energetic effort at simplification of exterior styling. It created a pattern of a reduction in chromium-plated masses; more tasteful treatment of moldings and other exterior ornamentation.

At the same time, each car producer strained himself to effect styling changes that would attract buyers. General Motors was in the most favorable position to achieve this end. Every GM division came out with an entirely restyled line, still lower and wider and in every instance breaking with the styling of the past. Judging by the evidence at hand General Motors has every intention of making similar radical changes in eye appeal next year too.

Air Suspension

But the effects of price resistance—the by-product of a recession year-had deeper impact. For one thing air suspension which had been hailed as the coming thing was greatly de-emphasized in 1959 models. The M-E-L Division discarded air ride altogether. Ford continued air ride but eliminated the costly mounting mechanism by resorting to Hotchkiss drive, employing long rear leaf springs in combination with air ride. Buick retained air ride only at the rear. although the other GM divisions have continued to offer air ride all around.

On the other hand, Chrysler took on air ride at the rear to supplement a large redesigned torsion bar front suspension system.

Does this mean that air ride is on the way out? It hardly means that, since every car maker now offers air ride in some form. It does mean a reappraisal with emphasis upon simplification of design and controls and plumbing, all directed at lower cost on the

New Car Design Reflects Business Conditions

price ticket. These considerations may well lead to a more acceptable system to the car buyer, at least to those who want and can pay for this refinement. Actually, the current trend to lower spring rates and softer ride makes the standard suspension quite acceptable to any car owner.

Fuel Injection

Another casualty of the recession was the fuel injection system. Still too costly in the present state of the art, the fuel injection system was discarded by all car makers, except as an item of optional equipment on a Chevrolet V-8 which is used primarily in the Corvette.

Here again, let's not write off fuel injection. Much work has been done to make it behave better and provide the plus engine performance necessary to justify it. It is our own opinion that fuel injection may well be the next step in improving the performance and economy of smaller engines in the near future.

Simpler Engines

What about engines? We summarized the picture quite completely in the November 15th issue of AUTOMOTIVE INDUSTRIES. Among the major points we emphasized that while displacement increased on many engines, horsepower did not. The implication is that engine designers took the alternate route of improving fuel economy rather than taking out still more power. Moreover, much of the expensive gadgetry involved in combinations of six-, and eight-barrel carburetor and induction systems was eliminated by some; and there was an increasing tendency toward more engines with two-barrel carbure-

Noteworthy too was the move to

By Joseph Geschelin

make available the six-cylinder engine as a lower cost, higher economy option. Studebaker-Packard, American Motors, Plymouth, Ford and Dodge of course continued their sixes. The important thing is that Edsel added sixes to their 1959 offering.

Economical Exhaust Systems

The same economy move was found in connection with exhaust systems. For several years the public had been urged to specify dual exhaust systems and some models had this as standard equipment. On most medium- and low-priced models this year, the single exhaust system predominates, although dual exhaust is offered as optional equipment. Engine designers tell us they have learned so much more about taking power from the combustion chamber that the advantage enjoyed by the dual exhaust system no longer is as important.

A by-product of price resistance is the current trend to improved exhaust systems—mufflers and tailpipes. There has been a big swing to heavier gage steel, aluminized steel, and in some instances a return to the use of asbestos wrapping of muffler shells, all designed to extend durability. If this trend persists, we may see aluminized steel and perhaps stainless steel as the preferred material for the entire exhaust system.

Aluminum Engines

While we are on the subject of engines, it may be well to speculate (Turn to page 23, please)

Detroit Diesel Develops

4-53 6V-71 FROM FUNDAMENTAL "71" DESIGN 2-71 3-71 BASIC "71" DESIGN

Fig. 1—Graphic illustration of building block or module concept in developing engines for the 53 and 71 series

TABLE !

DETROIT DIESEL'S NEW AND PRESENT ENGINE RATING AND WEIGHT COMPARISONS

Basic Engine HP and Speed Rating—Fan-to-Flywheel Weights

(Cast Iron Engine Weights)

EN	GINE	INTERM	ITTENT HP AF	ND RPM	CONTINUOUS	RATING	ENGINE WEIGHTS		
New	Present	Maximum Rating	Flated Intermittent	Industrial Rating	Maximum Rated Speed	@ 1200 RPM	Production Pounds	Production Lb/Max. HF	
	2-71 (2) 3-71 (2) 4-71 (2) 6-71 (2) 4-717 (4) 6-717 (4)	65 (a) 2000 113 (a) 2300 156 (a) 2300 244 (a) 2300 202 (a) 2300 310 (a) 2300	68 (a) 2000 102 (a) 2100 143 (a) 2100 219 (a) 2100 171 (a) 2300 236 (a) 2100	56 @ 2000 89 @ 2100 123 @ 2100 188 @ 2100 171 @ 2300 236 @ 2100	48 @ 1800 75 @ 1800 101 @ 1800 154 @ 1800	33 51 69 105	960 1525 1780 2190 1900 2365	14.8 13.5 11.2 9.0 9.4 7.7	
	4-71E (4) 6-71E (4) 6-110 (2) 6-110 (4) 6-110T (4)	160 @ 2300 241 @ 2300 300 @ 2000 325 @ 2000 375 @ 2000	140 @ 2100 210 @ 2100 300 @ 2000 300 @ 2000 360 @ 2000	130 @ 2100 195 @ 2100 260 @ 2000 270 @ 2000 330 @ 2000	113 @ 1800 170 @ 1800 230 @ 1800 237 @ 1800 260 @ 1800	75 112 160 160	1780 2190 3260 3260 3410	11.1 9.1 10.9 10.0 9.1	
2-63 (2) 3-63 (2) 3-63 (4) 4-63 (2) 4-53 (4) 6V-63 (4)		45 @ 2000 78 @ 2200 94 @ 2000 103 @ 2200 127 @ 2000 190 @ 2000	45 @ 2000 78 @ 2200 94 @ 2800 103 @ 2200 127 @ 2800 190 @ 2800	45 @ 2000 75 @ 2200 88 @ 2500 103 @ 2200 119 @ 2500 178 @ 2500	35 @ 1800 64 @ 2200 84 @ 2200 87 @ 2200 87 @ 2200 130 @ 2200	24 38 38 51 51 76	740 890 890 1040 1040 1340	16.4 11.9 9.5 10.1 8.2 7.1	
6V-71 (4) 6V-71 (4) 12V-71 (4) 16V-71 (4)		241 @ 2300 321 @ 2300 482 @ 2300 646 @ 2300°	210 @ 2100 280 @ 2100 420 @ 2100 560 @ 2100°	198 @ 2100 280 @ 2100 393 @ 2100 520 @ 2100°	170 @ 1800 227 @ 1800 340 @ 1800 454 @ 1800	112 150 224 300	1855 2305 3205 4710 &	7.7 7.2 6.7 7.3 &	

Maximum Rating—Used only for crew boat, pleasure craft, litery and generator stand-by installations. Rated Intermittent—Used for all intermittent load appli-

industrial Rating—The overload available above the co-ous rating when the smallest injector output is select the models shown.

Number of exhaust valves per cylinder.

Design criteria rating not available at present.

Design or letteria rating not available at present.

"E" Engine recommended.
Estimate is date.
Ings based on 90 F and 28.33 in. Hg. (dry) barometer
anteed to exceed 95% of the values shown.

Complete Line of Engines

ARKETING experience of the Detroit Diesel Engine Division, General Motors Corp., has shown that Diesels are wanted on many applications, but up to now there has been no full range available from the smallest to the largest sizes. For example, small farm tractors as well as 40 F refrigerator cars and reefers have needed engines in the range of 20 to 50-hp; while construction, marine, petroleum, as well as bus and truck now require horespower in excess of 300 and up to 1600.

Detroit Diesel now can supply power for innumerable applications: trucks: tractors: buses; earthmoving machinery; contractors equipment; off-highway vehicles; marine; industrial packages; industrial tractors; oil-field machinery; military packages; including ground support equipment for missiles; and many others.

To meet present as well as future needs, DED has launched an impressive family of two-stroke engines, together with V-type models that encompass a wide horsepower range. In making this move the company has eliminated the Series 51 loop-scavenged engines and has replaced them by the Series 53, a scaled-down version of the Series 71 engine and similiar in every respect, except for the fact that Series 53 units have wet cylinder liners whereas the liners for Series 71 are of dry type.

Figure 1 shows what has been

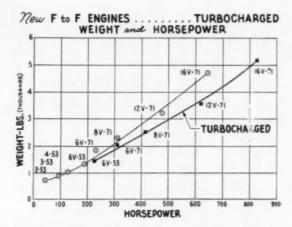


Fig. 2—Comparison of engine weight and horsepower for conventional versus supercharged versions of '59 engines

ENGINES	RATIE	165		-	H 0	R	5	E P	0	W	R		RA	N C	BE	Т
ADDITIONS MODELS	CONTIN	MAH			200	1	4	10		901		900		1000	- 0	199
2-53	24-35	45	П													Г
2-71	33-48	65														Г
3-53	38-64	94	1			777										Г
3-71	51 - 75	113														Г
4-53	51-87	127		H.												Г
4-71	69-101	159		113	П											Г
6V-53	76-130	190		101	3				1							Г
6-71	105-154	244		п	鮮碧					1						Г
6V-71	112-170	231		П	196											Г
6-110	160 - 237	325			56	新										Г
8V-71	150-227	311			91	齫										Г
TWIN 6-71	210 - 310	438				m	論									
12V-71	224-340	476				m		141		1						Г
TWW 5-110	320-474	600					Till		N.	9		1				Г
16V-71	300-454	646					100	T	100	3	T					Г
QUAD 24-71	420-620	875									A IS	の				Г
24V-71 TWIN IZV	448-480	952								I	廊	唐 第	art.			
32V-71 TWM 16V	600-910	1292		T						RE	1	10	15	6 5 5	Sheet	Ø

Fig. 3—Entire range of horsepower ratings for the complete line of new engines without turbocharging

accomplished in one sweep. At the left is the Series 53 family, consisting of two, three, and four-cylinder versions, supplemented with the 6V-53 built up from the 3-53.

The 6-71 family is much more extensive. Here we have two, three, four, and six-cylinder models as the base. From this are progressively built up the 6V-71, 8V-71, and 12V-71. In addition, there is a 16V-71 formed by two 8V-1's. When two 12V-71's are twinned, it results in a 24V-71; and two 16V's are twinned to produce the 32V-71. Moreover, each engine combination is made available with a

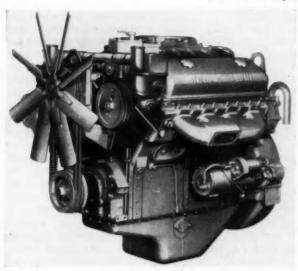
turbocharger to provide an increase of approximately 30 per cent in maximum output.

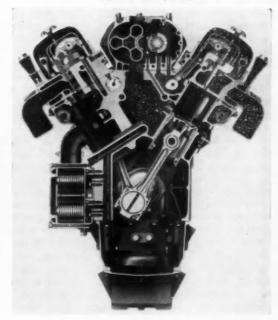
Ratings of the complete line, including the Series 110, which is being continued, are shown in Table I for unsupercharged versions; and in Fig. 2 which compares these ratings with turbocharged versions.

It is of interest that all current and new improvements in the area of fuel economy, durability, performance, and lower cost design have been incorporated in the entire family. In the 71 Series there is an impressive degree of interchangeability of parts among all models. In the main, practically all parts of V-71 engines are interchangeable with the inline-71 models, except for major elements such as the crankshaft and cylinder block. Not only does this reduce manufacturing costs materially it also promises major economies to fleet operators by reducing the number of high-use service parts

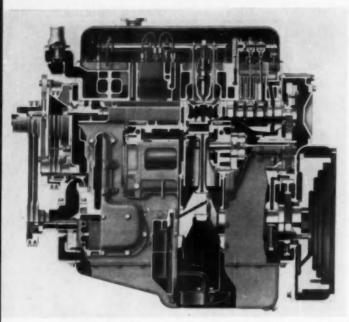
Traverse cross-section of typical Series 71 V-type engine with dry liners

Three - quarter side view of 8V-71 engine

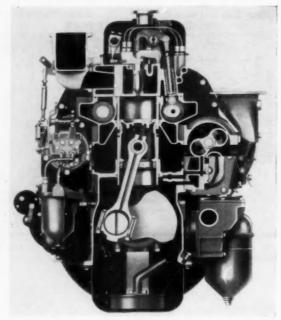




AUTOMOTIVE INDUSTRIES, January 1, 1959



Typical longitudinal section of Series 53 engine



Traverse cross-section of typical Series 53 engine with wet liners

that otherwise have to be stocked.

Even on the Series 53 there is some interchangeability of parts with Series 71, including injector, push-rods, cam followers, throttle control parts, and rear mounted accessories.

It will be recalled that DED also has produced aluminum engines for specific applications. Aluminum versions will be available with a possible weight reduction of 20 per cent on both V-71 and V-53 engines. Over 16 per cent weight reduction can be made on Series 53 inline models.

Interchangeability for the V-71 Series is further enhanced by making maximum use of parts already in production. For example, cylinder heads will be interchangeable with present 71 engines; pistons and pins are identical with those for the current 71 engines; gear trains will be similar to production gears; and blowers will be made in only two sizes—6 and 8-cylinder.

Series 53 engines and those of V-type offer many advantages from the standpoint of smaller installation dimensions, lighter weight, and greater horsepower than corresponding 71 inline engines. For example, the 4-53 will

fit into space now occupied by the 3-71 and delivers 12 per cent more power. The 6V-53 occupies less space than the 4-71 but delivers 20 per cent more power. This should make it a natural for small trucks and buses.

High speed performance is another major virtue of the 53 line. For intermittent duty, the 3-53, 4-53, and 6V-53 will deliver maximum output at 2800 rpm when equipped with four-valve cylinder heads.

Comparing the 6V-71 with the 6-71, the V-engine is only slightly wider, and for vehicle applications will be held to 34-in. However, it is much shorter and thus will be attractive for truck, bus, and earthmoving vehicles because of increased loading space and consequently larger payload capacity.

To truck producers it is of special interest that the 8V-71 occupies less space than the 6-71 but is rated 280-hp, compared with 210 for the 6-71E.

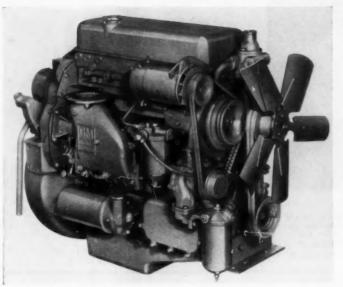
All V-type engines follow the pattern of the Series 71E in design, employ four-valve cylinder heads as standard equipment. Inline Series 71 are available with either two- or four-valve cylinder

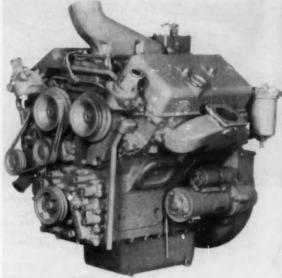
heads when specified, two-valve heads being standard. The same applies to the 3-53 and 4-53 models.

Coming to features of design for the V-71 engines, it may be noted that their length was determined by the 3-, 4-, and 6-cylinder heads with the 5\%-in. cylinder bore centers of 71 engines. The left bank on each of the V-71 engines is staggered 1.2 inches ahead of the right bank.

Crankshafts for the V-71 are of conventional, large-journal type with side-by-side rod configuration. Crank cheek thickness has been reduced but the useful length of the crankpin was increased by using minimum fillet radii and allowing minimum grinding wheel to crank cheek clearance. To carry the increased loading, both crankpin and main journal diameters were increased-from 3.5 to 4.5 in. on main journals and from 2.75 to 3.0 in, on crankpins. In the latter case this was accomplished by reducing bearing shell thickness by 1/32-in. and notching the bearings at the split line for clearance with the cap bolt.

An interesting feature of the V-71 engines is that special design considerations dictated the use of a





Three-quarter side view of 4-53 engine

Three-quarter front view of 6V-53 engine with accessories

63-1/2 deg Vee angle. Since it was desirable to make all Vee engines with the same angle, an extensive investigation was conducted to develop the balance requirements of engines having 6, 8, 12, and 16 cylinders. The final selection for each engine was one that gave the best balance among the governing factors. In the case of the 12V-71, for example, it was found that use of a single viscous damper, of the large size presently in production, cut torsional amplitude in half bringing it to a satisfactory 0.42deg double amplitude.

The four-valve operating mechanism of the 71E type cylinder head now incorporates a new stamped clevis-type bridge, actuating transverse pairs of valves. This automatically balances valve lash, and reduces spring and high speed follow problems by virtue of light weight. Only three different cylinder heads are required for the seven basic 71 engines. A 3cylinder head is used on the 6V-71; 4-cylinder heads on the 4-71E, 8V-71, and 16V-71; and 6-cylinder heads on 6-71E and 12V-71. Fuel supply and fuel spill passages are drilled in the head, replacing the external fabricated fuel manifolds employed previously.

Timing gears for the V-71 are standardized with those for the inline 71 by the use of separate balance weights bolted to the two camshaft gears, suitably for a specific engine. The idler gear runs on a preloaded roller bearing, both bearing and hub being standard parts.

As mentioned earlier, the Series 53 engines have the same design features as do the 71's. Cylinder spacing for all 53 engines is 5.4. On the 6V-53 the Vee angle is 6\%-deg, dictated by the use of a standard gear train, flywheel housing, and cylinder heads interchangeable with inline 53 engines.

Balancing of 53 engines follows 71 practice. Counterweights are placed on the crankshaft, and balance weights at the front and rear of the cam and balance shafts to balance primary rocking couples inherent in this engine. The 6V-53 has primary horizontal and vertical rocking couples balanced by weights on the crankshaft and on the two camshafts. Cylinder heads for the 3-53 and 6V-53 are interchangeable.

The Series 53 water pump is pulley-driven and represents an ideal in simplification. Only one right hand and one left hand rotation pump is required for the entire line without recourse to varying pulley ratios.

Mitchell Succeeds Harley Earl As GM Styling Vice-President

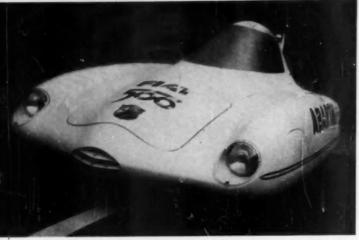
William L. Mitchell has been named to succeed Harley J. Earl as vicepresident in charge of the General Motors Styling Staff, effective Dec. 1. Earl, who joined GM 32 years go, will continue as a consultant to GM.

Mitchell has been director of GM styling under Earl since May 1, 1954. He joined the Styling Section in 1935 and eventually served as chief designer in the Cadillac studio and as assistant director of styling.

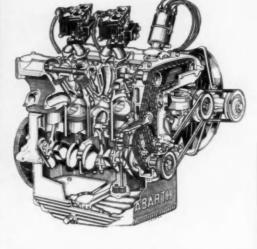
Earl styled the 1927 La Salle, which was built by Cadillac. He was named to head GM's first styling studio shortly after, a vice-president in 1940. In addition to some 50 million production cars and trucks, Earl supervised the styling of 37 experimental cars from the 1937 "Y-Job" to the present turbine-powered Firebird III.

Retired Chrysler Die Maker Awarded \$4150 for New Ideas

A Chrysler Corp. die maker who retired recently has been awarded \$4150 for three ideas for improving die setting methods that have been put into use at Chrysler's Highland Park plant. The company currently is considering 28 other suggestions made by Wilfred Styles, recipient of the award.



Fiat-Abarth 500 with special Farina body



The Turin Automobile Show

By Robert Braunschweig

New Ferrari 410 Superamerica with 385-hp V-12 engine At the Salone Internazional dell'.
Automobile, held in Turin last
November, the Italian automobile industry displayed its 1959 models side
by side with the latest offerings of
practically all automobile makers of

Part-cutaway view of the Abarth 750 Bialbero engine which has a piston displacement of 46

cu in.; develops 57 hp.

the Western hemisphere. Principal features of the show were numerous specialists' models designed for higher performance, and many indications of the influence of Italian body stylists both in their own country and abroad.

The majority of Italian cars displayed by Fiat, Alfa Romeo and Lancia have not undergone any extensive changes in design. In fact, the only new Fiat model is the 1500 Gran Turismo four passenger coupe on the 1200 chassis shown in prototype form.

Alfa Romeo showed the 2000 sedan which replaces the former 1900 series. The 2000 Spider with a specially designed body was displayed as a two-passenger convertible with detachable hard top. Its 98 cu in., four cylinder engine is said to develop 115 hp at approximately 5500 rpm. It has two horizontally mounted twin venturi Solex carburetors which provide a remarkably flat torque curve.

The Bertone-bodied Alfa Sprint Special two passenger coupe was shown in its latest design. Its 79 cu in. engine is claimed to develop approximately 100 hp at 6000 rpm. The fifth speed of its five speed transmission provides an overdrive ratio of 0.854 to one.

Ferrari presented the 410 Superamerica with an improved 300 cu in. V-12 engine which develops 385 hp at 6000 revolutions per minute.

The 750 Zagato coupe has a new Bialbero overhead camshaft engine with a piston displacement of 46 cu in. It develops 58 hp at approximately 7000 revolutions per minute; maximum torque of 50 lb ft is developed at 5000 rpm. The vehicle weighs only 1190 lb.



New Gran Turismo Flaminia by Lancia has two-passenger body made by Touring.



Alfa Romeo 2000 Spider with detachable top on Touring body



New Truck Transmission Eliminates Clutch Pedal

of Diamond T Motor Truck Co., Chicago, the Spicer Division of Dana Corp. demonstrated its new semi-automatic transmission system, called the Presto-Matic. Intended primarily for heavy trucks, of about two and one-half tons and larger, the Presto-Matic system permits the driver to shift gears without a clutch pedal, using a button on the top of the gear-shift lever for clutching.

In the system, an air cylinder and linkage replace the clutch pedal and release yoke arm. The cylinder operates either automatically on a pre-set with the engine speed, or by remote control from a knob on the shift lever.

While engine is at idling speed, the clutch is kept disengaged automatically, and the transmission may be shifted to the starting gear without pressing the shift knob. In starting gear, acceleration will automatically engage the clutch. Shifting gears is done in the usual manner, except that the clutch is disengaged by pressing on the knob during shifting, and re-engaged when the knob is released. Pressing the knob activates a solenoid valve, causing air to move to the clutch air cylinder which disengages the clutch.

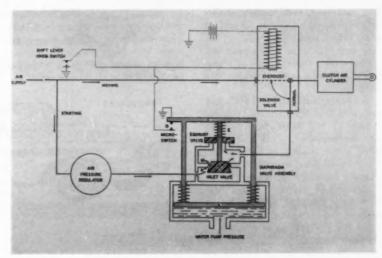
Releasing of the knob causes the solenoid to return to normal, cutting off the air supply to the clutch air cylinder, which exhausts through a valve. While the truck is moving in normal operation the inlet valve to the cylinder is closed and the exhaust valve is open, with the clutch engaged.

The clutch is automatically disengaged at a near-idle speed of 500 rpm, and is not fully engaged until the engine is turning about 1500 rpm. Actually, the clutch is capable of handling full engine torque at about 1000 rpm.

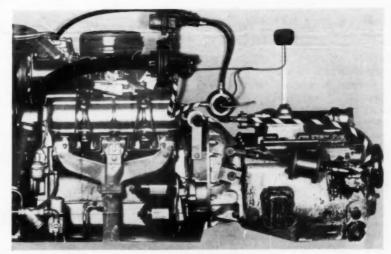
A diaphragm valve, operating with water from the engine cooling system, controls the flow of air through an air pressure regulator to the clutch air cylinder for starting from idling speed. As the engine accelerates, the movement of

the diaphragm opens a microswitch to de-energize the solenoid to normal position, and also permits air to bleed from the system, finally closing the inlet valve. The air in the clutch air cylinder escapes through the exhaust valve and the clutch engages. Clutch engagement is controlled in direct proportion to engine speed, resulting in consistently smooth starting.

For the present, the Presto-Matic is available only as an option on Diamond T Diesels. It will be manufactured at the Toledo Division of Dana Corp.



Schematic drawing of the Presto-Matic controls



Side view of engine with Presto-Matic transmission attached

Increased Use of

Stainless Steel Brightwork on 1959 Automobiles

HE use of stainless steel brightwork on 1959 passenger cars is up about 15 per cent over last year, even though visually there might appear to be less on some lines. Definite trends are developing this year which may determine the future course of stainless steel in automotive design and engineering.

An analysis of available statistics indicates that 1958 models required a total of 37.2 lb of stainless steel per car produced. This was somewhat above the figure for the previous model year, when 36.0 lb were shipped for every car made.

Sculptured styling, which was originally thought to reduce the amount of brightwork required from the stylists' point of view, is actually causing an increase this year. Since sculptured styling results in "exposed edges" on some current models, stainless steel moldings are used to provide protection against chipping and scratching on these edges. They blend well into the sculptured design and add a desirable highlight in addition to providing protection.

Body side moldings, among the most functional applications for stainless steel, are undergoing considerable change this year also. One car line, for example, has widened the molding and developed a rolledin pattern which provides even greater protection against chipping, scratching, and body denting.

The increased use of glass on 1959 models is also adding to the amount of stainless steel currently used. Larger windshields and backlight require longer moldings to cover their perimeters. The moldings improve weatherproofing and protect rubber stripping from ozone cracking.

Changes in body configurations and the use of stainless steel pillars have resulted in station wagon designs which are closer in appearance to sedans this year than ever before. These stainless-capped pil-

lars blend well into the glass area.

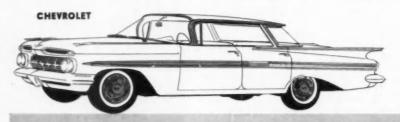
Body panels in stainless steel are unquestionably one of the major uses looming on the horizon. Chrysler Corp. is using stainless steel roof panels on its 1959 Imperial models. The panels are a No. 3 mill-finished stainless steel which required no additional finishing after fabrication. This brushed or satin finish yields a panel which blends into the entire car regardless of body color, providing a rich look.

While it is too early to provide detailed figures for applications of stainless steel on all car lines, an indication of current usage is found in the following figures:

PLYMOUTH BELVEDERE (Two-Door Hardtop)

EXTERIOR STAINLESS USAGE

	1958	1959		
Total Parts	76	71		
Total Area	4028 sq in.	4915 sq in.		
Total Weight	22.935 lb	26.660 lb		
Per Cent Increase		16.2%		







Further evidence of the trend toward functional brightwork is the treatment given the new Studebaker Lark Regal. Where previously Studebaker stripped its Scotsman models, the new Lark makes use of functional brightwork for body moldings, window moldings, and wheel covers. It utilizes about 16 lb of stainless steel despite its smaller size.

Today, between 18 and 45 lb of stainless steel are used per car for decorative trim, according to C. O. Durbin of Chrysler Corp. Speaking at the December AIME meeting in Detroit, he went on to say that the alloys being used now are essentially the same as those used prior to 1930.

Type 430 is still being used for most stainless steel parts. Type 301, containing 17 per cent chromium and 7 per cent nickel, is being used for parts difficult to form or for parts requiring a high yield strength. Wheel covers and windshield wiper arms are usually made

of Type 301. Moldings, hub caps, headlamp doors and retaining rings, radiator grilles, and similar parts are made of Type 430.

Another alloy, Type 201, containing manganese, has been used for some parts as an alternate to Type 301. It has not as yet, however, gained wide acceptance.

Type 430 parts, when used adjacent to chromium-plated parts such as for radiator grilles, may be given a chromium flash. Usually, however, the color of Type 430 stainless steel is considered satisfactory. Chromium plating of Type 430 stainless steel is specified on decorative trim for the more expensive cars to obtain a more durable higher luster.

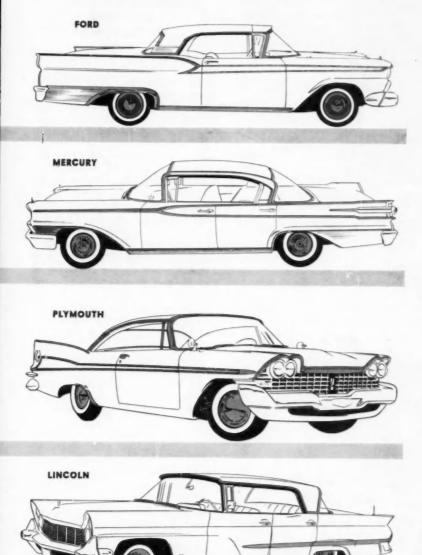
Stainless steel is competing, both in cost and quality, with chromium-plated steel, chromium-plated die castings, chromium-plated brass, and anodized aluminum. The choice of which material to use depends to a great extent on the shape of the part, appearance, and strength requirements, and the total overall cost.

On roll-formed sections such as trim moldings and bezels, stainless steel Type 430 has an advantage. Frequently, parts must be designed for several of the trim materials and the lowest cost satisfactory material is chosen, Mr. Durbin stated.

The Chrysler official commented that while the use of anodized aluminum for decorative automotive trim has been increasing, it is not expected that stainless steel will be replaced. Although the weight of stainless steel was lower for 1957 and 1958 (see chart), when anodized aluminum was used in greatly increased quantities, the usage of stainless increased in 1959.

Welding Stainless to Carbon Steel

At this year's meeting of the American Society of Body Engineers (see AI, Nov. 15, 1958), a demonstration of spot welding stainless steel to carbon steel attracted considerable interest. Sound welding requires no departure from conventional equipment or techniques, and welds of the combined metals are said to be stronger than



those found in two sheets of carbon steel.

Thus, it is possible to use stainless steel in production practice to provide both brightness and structural strength in one part. Among the uses envisioned for this practice are corner posts, integral rocker panels, integral wheels with bright outer faces, muffler components, roof panels, and deck lids.

Where desirable, carbon steel studs can be welded to stainless steel moldings and stampings for fastening. This will permit the use of stainless stampings in place of

STAINLESS STEEL TRIM (Weight-Typical Car)

Year	Lb
1959	29
1958	18
1957	20
1956	25
1955	25
1954	29
1953	19

die castings, with cast-in studs, and provide good "color" matching on assemblies such as complex side molding treatments.

OUTLOOK for the Future

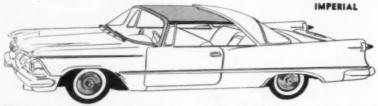
Numerous development programs are underway by both stainless steel producers and automotive companies to expand the functional applications of stainless steel. The Committee of Stainless Steel Producers of the American Iron and Steel Institute is expected to unveil a number of new and significant applications at the SAE Annual Meeting in Detroit, Jan. 12 through 16.

Included in the display will be stainless steel production mufflers for trucks, a thin stainless corner post, a stainless steel passenger car heater, and similar functional parts. The thin corner post is a design based on the reduction of corner post cross sections by using high-strength stainless for the structure, finishing exposed surfaces, and thus eliminating interior and exterior garnish moldings.

Considerable development work is underway on stainless steel bumpers, and a number of production tests have been made. By using a work hardening stainless steelsuch as Type 301 (now used for wheel covers) or the newer Type 201-it is possible to obtain strengths on the order of 175,000 psi. This higher strength permits a substantial reduction in the gage of material required. Consequently, greater weight savings are achieved than could be possible even through the use of "light" metals with strengths of around 35,000 psi.

Finishing costs could also be substantially lower for stainless steel bumpers. The material does not require plating or other electrochemical treatments.









AUTOMATION NEWS REPORT

AUTOMATIC CONTROLS

PRODUCTION-VEHICLES-AIRCRAFT

By Samuel Cummings

PACKAGED MASER

Sylvania Electric Products Inc. announced it is launching a program to cut down the size of its MASER device—now in the laboratory stage—so that it can be packaged for use in military aircraft and in the field.

MASER (microwave amplification by stimulated emission of radiation) is expected to increase radar range up to seven times, as well as boost the "seeing power" of other types of electronic gear.

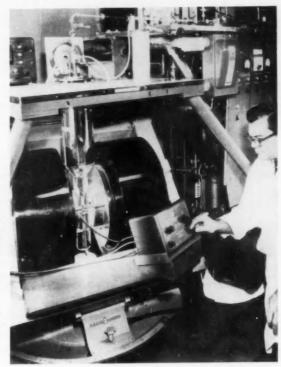
Dr. Robert M. Bowie, vice-president of Sylvania Research Laboratories, said MASER will be used in ultra-long-range radar, missile tracking, space communication, and radio astronomy.

MASER, Dr. Bowie explained, is an amplifier which uses a magnetic crystal at its heart. The crystal may be a synthetic ruby, or a crystal of potassium cobalticyanide.

The MASER operates on the principle that such crystals will emit a relatively large amount of stored energy when stimulated by very weak microwave radiation received by a radar antenna.

Vibrations of the atoms in the crystal which would interfere with the radar signal are prevented by cooling the crystals to a temperature near absolute zero by use of liquid helium from a device known as the Cryostat. While the crystal is being held at this low temperature, a magnetic field is applied. This field enables the crystal to store energy at one frequency, and then release this energy when a small microwave signal of appropriate frequency is received, thus adding to-or amplifying- the received signal.

Complex laboratory equipment used in MASER research is measuring the magnetic field being applied to a MASER crystal. The two black drums in the foreground are the coils of an electromagnet; the silver flask is a container for liquid helium and liquid nitrogen, which keep the crystal at a temperature close to absolute zero.



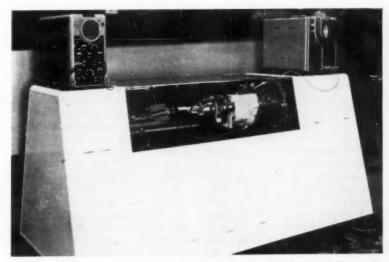
Dr. Bowie said that the packaged MASER system would include as integral parts a small, built-in cooling system and a small permanent magnet instead of the huge electromagnets now used in unwieldly laboratory systems.

INDUCTIVE COUPLING

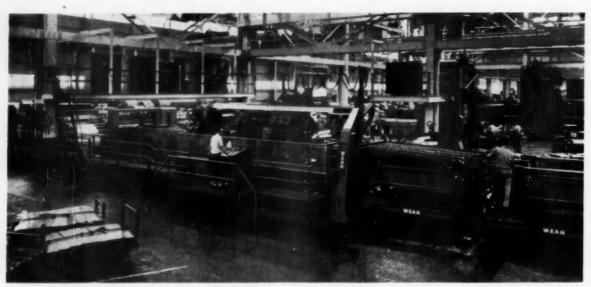
Stresses in rotating parts can be measured by an inductive coupling between strain gages and indicating instrument, thus eliminating the use of slip rings.

Developed by Birfield Engineering Ltd., Birmingham, England, the system uses a miniature battery-operated electronic oscillator and transistor amplifier to create a magnetic field in the coil of wire wound round the propeller shaft or

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Inductive coupling eliminates slip rings when measuring stresses in rotating parts



Perspective of one of the "firsts" at Mansfield, the Wean "trap" shear which can be adjusted to make any desired variety of rectangular or trapezoidal shaped blank. This unit consists of the following pieces of equipment, reading from left to right: uncoller, flex rolls, loop pit, feed rolls, hump table, feed rolls, shears, classifier, and double stackers.

Latest Techniques at

New Fisher Body Plant at Mansfield

TEMMING from the postwar expansion program of General Motors Corp., the Fisher Body plant in Mansfield (Ohio), the latest of industry press shops to come on the scene, represents the most advanced practice known to the art. Situated on a 273-acre tract, the plant has a productive floor space of 1,350,000 sq ft.

Visualization and planning of this important facility was the result of committee action that brought to bear the experience and resources of many specialists. Plant layout is simple in essence and this of itself gives indication of farsighted planning.

Incoming stock, mainly steel in coils, comes in on the railroad siding. It may be noted that only stock for the roof panel is received in sheets. In this area there is space for storing about 30,000 tons of steel. Maximum daily consumption is around 2000 tons. The plant

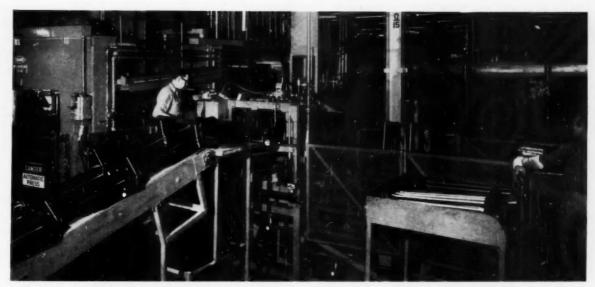
was consuming around 1500 tons at the time this article was prepared.

There are 26 parallel press lines which are tooled for specific kinds of body parts. While it may be an oversimplification, it may be said that raw materials flow through the rows of press lines and assembly equipment in straight lines directly to finished parts storage in the area at the opposite side of the building. From here the parts are loaded, according to schedule, into freight cars for shipment to Fisher Body plants and B-O-P plants all over the USA.

Some of the parts such as doors, rear compartment pan, seat frame, and others entail a variety of welding and fabrication operations to complete an assembly or sub-assembly. This is done in the area next to the press lines with equipment arranged in direct line with the presses producing component stampings.

By Joseph Geschelin

Although all equipment, press lines, welding lines, etc., embody the latest techniques in mechanization, including many presses operating on fully automatic cycles, Mansfield is in reality a batch type operation-a job shop on a grand scale. The reason for this becomes obvious. The plant supplies stampings for all B-O-P divisions as well as other Fisher Body plants all over the country. While the new Fisher Body concept of standardization (see AI, November 15, 1958) results in considerable similitude in size and shape among parts common to all bodies, there are certain differences in detail requiring special operations and tooling.

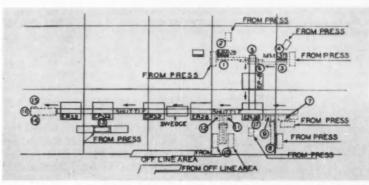


Close-up of one of the stages of sub-assembly on the rear compartment pan line. Here an automatic shuttle is being loaded with gas tank straps and center section of the pan to form the nucleus of the final assembly.

To take a typical example, Mansfield makes rear doors for three GM divisions. In actual part numbers the plant makes 21 different door assemblies. Wide experience gained over the years has evolved a technique of making basic dies with removable sections to suit the differences in detail required for similar parts. Thus it is necessary to schedule runs of parts for one or more days continuously, then stop the press line to change the die for another similar part. Maximum efficiency and minimum down time for this kind of operation have been gained by the facility with which die sections can be replaced. In conventional practice it would be necessary to replace the entire die

Coming to the details of press shop operation, it is of interest that all raw material is received in coils, except for sheets required for making the roof panel. This is no longer the enormous stamping of "turret top" days. It is much shorter due to the influence of the larger glass areas. Nevertheless, the sheet for the roof is a high quality, deep drawing stock for which they pay a premium.

There is considerable economy in using steel in coils. For one thing, they can buy and store coils of uni-



Schematic layout of welding press line for producing the rear compartment pan assembly, as illustrated in large photograph above.

form size and width. For the smaller and narrower stampings, Mansfield has installed a large Wean slitting unit, consisting of an uncoiler, slitter, and recoiler. Here they can produce sheet stock in any desired width without waste. All of the coil stock is put through a bay of blanking presses, mostly Danly presses rated 400- and 200-ton capacity, served by Wean uncoilers. These produce blanks of proper size for the various press lines.

One of the noteworthy "firsts" at Mansfield is the first example of a large Wean flying press. Rated at 250-tons, it has a bed of 108 in. and is capable of producing at the

rate of 90 strokes per minute. At the present time it is cutting blanks for very high production common parts. This press can be converted for making stampings either with single or progressive dies if parts are required in sufficiently large quantity in the future.

Space does not permit a detailed description of the operation and mechanization of each of the press lines. However, the basic design concept is the same. Generally speaking, each of the press lines is arranged to handle all operations on a given part from the blank to the finished part. In some instances blanks are loaded automatically, in other cases they are loaded manual-



Start of the roof panel line. The first operation, 1000-ton Danly press is fed by means of the automatic sheet loader in the foreground. In addition, the drawing compound is applied automatically before the sheet enters the die.



Typical of Mansfield practice, the roof panel blank is drawn from the die by means of the Sahlin iron hand and deposited on the chain transfer conveyor for transport to the next station.

ly. In all cases hazardous loading and unloading operations are performed mechanically.

For example, the unloading of stampings from the back of each press is done with the familiar Sahlin mechanical hand. For small stampings the hand has only one finger mechanism; for longer stampings the hand is equipped with two gripping fingers. Feeding between presses too is fully mechanized, for the most part, with the feeding device designed specifically for the operation. This consists, usually, of some form of shuttle mechanism. However, in some cases there is a transfer bar mechanism and on some there is a turnover mechanism to reverse the positioning of the stamping. In any event, it is noteworthy that all of these automatic devices were designed by Fisher Body engineers.

Mechanization and automaticity of operations are as complete and as thorough as economic conditions warrant. For instance, there are many presses on the various lines that operate automatically without any operator attention. Such presses are marked with a suitable sign for easy identification.

One result of such extensive mechanization is that Mansfield requires more maintenance people than press tenders. Mechanization has not resulted in reduced payrolls nor has it eliminated workers. What has happened is that mechanization has created new job classifications, new acquired skills, higher pay rates.

In total, Mansfield has 182 large presses; including Danly, Bliss, Hamilton and Clearing; 109 smaller presses, including Danly, Clearing, Minster, Cleveland; and 20 progressive die and blanking presses. Largest of the presses are 1250- and 1000-ton Danly. As a matter of fact Mansfield has 36 1000-ton Danly presses; four 1300ton Clearing presses: and four 1250-ton Danly presses.

As mentioned earlier, fabrication and welding of sub-assemblies is handled in automatic welding machine lines directly in line with the specific press line that produces the component stampings. Again the flow is quite complicated and would

require much more space than one could allot an article of this kind.

To provide some impression of how the job is done, we have reproduced a flow diagram for the welding setup on the rear compartment pan assembly. Key to the sequence of operations, hence the lines of flow, is in the number for each station. These may be identified as follows:

- Feed cross bar and weld.
- 2. Rear body bolt spacers and weld. 3. Load rear extension and weld.
- Load rear compartment pan and weld.
- 5. Load rear cross bar assembly onto shuttle.
- 6. Load subassembly rear center extension onto shuttle. 7. Rear compartment pan relief, load
- 8. Stock rear compartment pan.
- 9. Loan pan on shuttle.
- 10. Load spare tire pocket assembly on conveyor
- 11. Extension assembly, load on shut-12. Load shuttle with spare tire pocket
- assembly (stored at 10).

 13. Load rear compartment pan front in fixture and hit set-up button.

 17. Clip gas tank tube vent in fixture
- and hit set-up button.

It may be noted that welding stages occur at the points marked-MM-29, MM-30, EP-8, EP-28, and

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Flight Safety Emphasized at Aircraft Hydraulics Conference

By Joseph Geschelin

UTURE requirements of hydraulic systems for missiles and aircraft, and the design philosophy of hydraulic systems and equipment for new aircraft such as the Lockheed Electra, Convair 880. Boeing 707, and large Sikorsky helicopters were outlined at the 1958 Aircraft Hydraulics Conference in Detroit, sponsored as usual by Vickers, Inc. Other new developments stemming from Vickers' research were beamed to the largest audience of airframe and engine producers, and airline operators ever to gather for this annual event.

Lockheed Electra

In describing the hydraulic system for the Lockheed Electra, Harlan R. Asquith emphasized that the system is divorced from the turboprop engines, pumps being driven from the new 208/120-volt, 3-phase, 400-cycle A-C electrical system of high capacity and high reliability. It is powered by four 60-kva engine-driven generators, connected to two priority buses and one utility bus through an automatic transfer system.

Objectives of the design of the hydraulic system included the following: it much provide a higher degree of safety than conventional systems; it must be more reliable than conventional systems; serviceability must be better; installed weight must be kept as low as possible

The hydraulic system consists of two completely separate systems, each with its own reservoir, pumps, control valves, and operating units without cross-over valves or other hydraulic connections between them. Flight control boosters each have a control valve and an operating cylinder so they can be operated in the event of complete power failure of either system. Wing flaps have a control valve and an operating motor in each system for the same reason.

Each system has an operating pressure of 3000-psi with most of the equipment housed in a hydraulic service center below the cabin floor just aft of the wing box. Housing of the electrically-driven pumps in the pressurized service center removes all pressurized hydraulic fluid from engine fire zones, avoiding one of the greatest potential hazards in an airplane. Reliability also is enhanced since failure of one or even two engines does not mean the loss of any hydraulic pumps.

Functions of the hydraulic system are divided into flight and ground requirements. Most important of flight requirements is that of operating the flight control boosters on all three control surfaces, even though one or two engines become inoperative. Other functions include actuation of wing flaps; retracting and extending the landing gear; operating the windshields; operating a self-contained engine operating system on airplanes with such equipment; power for retracting or extending built-in passenger stairs on airplanes with such equipment. One of the most important functions is that of positive operation of brakes, together with the requirement that braking be available when the airplane is towed with engine stopped. Another ground requirement is that of steering, to permit cross-wind landings or take-offs, and to maneuver the airplane easily.

Convair 880

The hydraulic system on the Convair 880, described by Dwight Moore, by contrast features enginedriven hydraulic pumps. In planning the system Convair engineers took into account the following design considerations: control of entrained air in the system; pump case pressures; cavitation; contamination: temperature control: trouble reporting from the field. Convair 880 has two hydraulic systems. each one made up of three subsystems, with a different pressure level maintained in each one. These are identified as follows:

1. High pressure sub-system which delivers fluid from the engine driven pumps to the various hydraulic motors and actuating cylinders. Operating pressure is of the order of 2900 psi.

2. Medium-pressure sub-system in which a pressure of about 70 psi is maintained by the reservoir boost pump. It furnishes fluid to the engine driven pumps and serves as a return for the fluid after it passed through some of the actuators and hydraulic motors.

3. Low pressure, sub-system with normal pressure of about 40 psi which serves to return spent fluid from hydraulic pump cases, some actuators, and some of the hydraulic motors.

Design philosophy also included provision of two large accumulators to serve the brake and main landing gear sub-systems. The airplane specification calls for gear retraction within 10 seconds, the initial

(Turn to page 60, please)

by William F. Boericke

Steel Output to Increase in 1959

Steel output in 1958 approximated 85 million tons. In 1959, estimates are within the range of 105 to 115 million tons. An Inland Steel executive places it at 110 million tons. As the 1959 capacity will be about 145 million tons, up 4 million tons from the 1958 figures, this would indicate an averaging operating rate of more than 75 million tons for the year.

The steel industry enters 1959 optimistically. The last quarter of 1958 was the best of the year, although perhaps a little short of enthusiastic hopes in October. But the closing weeks showed definitely more zip in the market, with a bow to Detroit. Auto makers were prominent with rush orders for flatrolled steel for December delivery in an effort to make up output that had been curtailed by strikes. The increase in orders was greater than production, hence backlogs improved insuring a carryover into early months of 1959.

No Shortage of Steel

There appears to be little danger of any shortage of steel. Obviously with 145 million tons capacity, ample steel is available for any upsurge in demand over the estimated 110 million tons for industry's needs. True enough, consumers have not yet begun to stock up to any extent on their inventories, which are estimated by *The Iron Age* to have declined to the lowest point since 1950.

It is likely that inventory replacement will be a strong factor in the

first quarter of 1959 in an effort to be prepared for a steel strike that could occur after July 1. Rather wide acceptance of the view that a strike is probable seems to permeate the industry; but as often happens, the more widely the possibility of a strike is advertised, the less likely it is to occur. Nevertheless considerable hedge buying of steel is anticipated which would make the first half of the year intensely active for the mills. A good guess would be that by the end of June consumers would have taken on about four million tons of steel to play safe. If no strike occurred this would cut down demand in the second half and make the first six months the best period of the year.

The Memphis Decision Constructive

The decision by the Supreme Court, reversing an earlier decision by a lower court on the Memphis case, brought joy to the natural gas pipe lines and accompanying satisfaction to makers of line pipe who foresaw possibility of sales of this equipment doubling. Pending clarification by the Court, line pipe had been a laggard item in the steel industry. An increased demand for heavy plates should likewise follow.

Aside from the auto industry, steel men look for better demand from the appliance manufacturers who had already begun to increase their orders before the close of the year. Construction in 1959 will be a strong factor aided by highway work. Galvanizers are doing an excellent business and tin plate manufacturers expect renewal of interest in the first quarter. Railroad buying in volume is doubtful, but it could come as much rolling stock must be replaced. The outlook for shipbuilding is not good.

Export Demand Down

Two markets enter the new year under a cloud. The export demand fell off badly in 1958 and is not expected to improve in 1959. In fact European competition in this country, notably in wire products, is causing a lot of trouble. Sharp competition in the South American export field is a certainty.

Scrap Depressed

The other sore spot is the scrap market where the trade has had a most unhappy year. Consumer demand has been poor and, according to the Scrap Institute, the depression in the industry is the worst since 1930. Sales by scrap dealers were off by 50 per cent for most of the year, while inventories increased 24 per cent. Although steel production increased 95 per cent from April through October, consumption of purchased scrap was up only 31 to 35 per cent. Meanwhile, prices of scrap plummeted with No. 1 dropping to \$41.50 per ton and No. 2 to \$33. Blame is placed on use of hot metal, instead of scrap, by the steel mills who brought back idle blast furnaces into production and hence bought less scrap. No improvement in conditions appears in sight.

Copper Demand Slows Up Abroad

On the basis of the statistics, copper should command a higher price than 29 cents a pound. While mine production has increased rapidly since cutbacks in output were eliminated both in this country and abroad, shipments to fabricators have increased even more rapidly, with the result that stocks have plummeted to the lowest level since 1956. Refined stocks of metal

of all countries reporting to the Copper Institute were equal to no more than a month's supply at the most recent rate of shipments.

Nevertheless, the copper price has been no more than steady at the producers' level, while the smelters' price has wavered between 281/2-29 cents. In London the metal has shown pronounced weakness, with the price falling sharply from a peak of 371/2 cents to less than 28 cents in mid-December. On the N. Y. Commodity Exchange copper futures have been in a definitely bear market, and the ebullient talk only a month ago of 35 cent copper has gone with the wind -temporarily at least. Copper scrap prices have been cut to 221/2 cents, equivalent to about 271/2 cents for refined metal deliverable 90 days hence.

Various explanations are offered for the change in speculative sentiment. The end of the Rhodesian strike undoubtedly calmed traders abroad. Imports of copper from the U. S. were another factor, but probably the growing tension in Europe because of the Berlin crisis has tended to slow business activity on the Continent, and with it the demand for copper. In this country there is little doubt the heavy purchases in October and November were in part inspired by the desire to build up depleted inventories before further price rises ensued. Quite likely these purchases represented in some instances only a transfer from producers to consumers stocks and not actual movement into consumption.

Outlook for 1959

Barring a major strike at the mines, the possibility of which appears remote in the first half of this year, copper should be in adequate supply for consumers' needs at a reasonable price level, between 28 and 31 cents a pound. World production and consumption are now virtually in balance. No major addition to mine production either in the U. S. or abroad is foreseen before 1960 and present prices for the metal are not high enough to encourage reopening of marginal mines.

It is less easy to estimate world consumption. In the U. S. actual consumption measured by deliveries to users was 1,155,700 tons for the ten months January-October, and should approximate 1,400,000 tons for the full year, which would be in line with consumption in 1955-6, but about 110,000 more than in 1957. It is reasonable to believe this rate will be maintained in 1959.

It must be emphasized that large copper producers are opposed to violent price changes for their metal and hope to maintain reasonable price stability. A price of 31-33 cents is regarded as insuring its position competitively with aluminum, whereas the sky-high market of 1956-7 resulted in losing substantial business to the other metal that will probably never be regained. No repetition of this misfortune is wanted.

Alcoa Will Hold Aluminum Price Line

The outstanding development in aluminum was the announcement by Alcoa that it would hold the present price line through the first half of 1959. Current published prices will apply on all products ordered and shipped prior to July 1. Previous price protection has only extended to 60 days. Other aluminum producers quickly followed Alcoa's lead.

The Alcoa announcement appears to have put an effective quietus on widespread rumors of a forthcoming price increase for the metal after the first of the year. In effect, it guarantees present prices on both existing and new orders and makes it unnecessary for consumers to make unnecessarily large commitments to forestall a price increase. It conforms as well with the long-established policy of the aluminum producers to maintain price stability whenever possible. While Alcoa's pricing policy does not bar other producers from pursuing a different pattern, it makes it very unlikely that any other would attempt to do so.

Larger Production Capacity in 1959

The fourth quarter provided the best business of the year for the aluminum industry, but the final tally for 1958 shows shipments about 7 or 8 per cent below 1957, thus reversing the historical 10 per cent increase that has characterized the industry in the last decade. Aluminum executives, however, are entirely optimistic over the future and expect to see a 15 per cent increase in business in 1959 over the 1,750,000 tons shipped in 1958. This would push the figure up to 2,100,000 tons, which would be just about the present installed capacity.

Nevertheless, even if this rate of output were attained, it would not follow that the industry would operate at 100 per cent of 1959 capacity, as by the end of the first half of the year, an additional 286,500 tons will have been installed from expansion of production facilities planned in 1957-8. In spite of slower business in 1958, not a single expansion project has been cancelled, a vivid testimonial to the faith that aluminum leaders have in their industry. It follows that the industry will be able to handle all demands from consumers for some time to come and can readily guarantee adequate and steady supplies of the light metal on a long-term

Zinc Situation Continues to Improve

The November zinc statistics continued to show the cheerful aspect of the month before. Curtailed domestic production was substantially less than shipments, and in consequence, smelter stocks were reduced by 18,400 tons by the end of November. This brings them down to about nine weeks' supply at November rate of shipments, and the total reported of 191,700 tons was the lowest since February.

December sales slackened off in comparison with the hectic pace in October. Many observers declared the slack demand arose because of heavy tonnages acquired in October and November when consumers largely anticipated their requirements for the next few months. However, the producers' price of 11½ cents a pound has been firm in spite of some shading in London and on the Commodity Exchange.

The extraordinary improvement in the zinc situation deserves further comment. Without benefit of shipments to the Government stockpile since last April, shipments virtually all to domestic consumers

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· · INDUSTRY STATISTICS · ·

WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

	Week	cs Ending	Year t	to Date
Make	Dec. 13	Dec. 6	1958	1957
PASSENG	ER CAR	PRODUCTION	N	
Total - American Motors	6,362	7,961	198,100	106,38
Chrysler	401	1.612	47.552	115,79
De Sete	205	947	35,121	115,84
Dodge	597	1,902	100,970	287,70
Imperial	469	488	12,608	37,09
Plymouth	3,847	9,775	355,507	638,300
Total - Chrysler Corp.	5,519	14,724	560,758	1,192,852
Edsel	1,925	1,817	22,492	53,461
Ford	33,370	33,391	965,195	1,457,807
Lincoln	882	863	24,026	36,136
Mercury	5,394	5,473	117,191	267,467
Total-Ford Motor Co.	41,571	41,564	1,128,904	1,814,871
Buick	11,247	10.931	235,515	388,078
Cadillac	4.402	4.413	117,049	147,152
Chevrolet	45,298	43.894	1.156.729	1.449.193
Oldsmobile.	11,150	11.076	287,404	370.864
Pentiac	9,098	9,342	199,407	325,940
Total General Motors Corp.	81,195	79,656	1,996,104	2,681,227
Packard			1,723	5,106
Studebaker	3,321	3,357	47,591	65,938
Total Studebaker-Packard Corp.	3,321	3,357	49,314	71,044
Checker Cab	123	131	3,030	3,871
Total Passenger Cars	138,091	147,413	3,936,210	5,870,258
TRUCK AN	ID BUS	PRODUCTION	1	
Chevrolet	8,972	8,460	257,745	330,108
G. M. C.	1,604	1,790	58,009	66,563
G. M. C. Diamond T	160	135	5,556	5,584
Diveo	70	70	2,814	2,727
Oodge and Farge	1.824	1,850	55,252	74,897
Ford.	6,406	7,094	229,791	324,694
F. W. D.	13	9	1,160	1,000
International	200000	*****	79,914	116,733
Mack	290	252	13,415	16,521
Studehaker	337 422	284 419	9,863 16,530	13,215
White	2.697			18,054
Willys Other Trucks	2,007	2,141	87,675 2,760	72,201 4,010
Total—Trucks	22,855	22,564	820, '84	1,055,307
	0.0	40	0.000	0.747
Buses	35	40	2,882	3,745

1958 TRUCK TRAILER SHIPMENTS

Industry Division, Bureau of the Census

		Ten f	Vienths
Type of Trailer	October	1958	1957
Vans Insulated and refrigerated Steel Aluminum	312 15 297	2,853 286 2,567	3,966 532 3,424
Semi-insulated Steel Aluminum Furniture	50 18 32 112	457 457 1.291	570 103 467 1,382
Steel	93 19	1,291	1,382
All other closed tep Steel Aluminum Open-tep. Steel Aluminum	2,066 641 1,425 357 99 258	4,596 9,440 1,879 874 1,780	8,011 9,842 2,764 1,401 1,363
Tetal-Vans	2,897	20,516	26,525
Tanks Non- and low pressure Petroleum			
Carbon and alloy steel	255	1,916	
Stainless steel	28 143	188	
Total-Petroleum	426	3,277	4,111
Chemical, food, fluid solids. All other, incl. aircraft refuelers. High pressure (LPG, chemicals, etc.)	21 25 43	468 377 276	******
Total-Tanks	515	4,398	5,593
Pole, pipe and logging			
Single axle	27 52	279 470	470 638
Total	79	749	1,100
Platforms Racks, livestock and stake Grain bodies, all types Platforms (flats), all types	80 103 711	1,177 836 5,142	2,165 1,211 5,923
Total Platforms	894	7.155	9,299
Low-bed heavy haulers Dump trailers All other trailers	191 223 190	2,624 2,125 1,659	2,581 1,860 3,151
Total Complete Trailers	4,989	38,626	50,109
Trailer chassis ¹	262	2,715	3,731
Total-Trailers and Chassis	5,251	41,341	53,840
Sold Separately.	5,251	41,341	33,04

REGIONAL SALES OF NEW PASSENGER CARS

					Ton	Months		Per Cent Char	90
		October	September	October	2 4011	reignins	Oct. over	Oct. ever	Ten Months
Zone	Region	1958	1958	1957	1958	1957	September	Oct. 1957	1958 over 1957
1 2 3 4 8 6 7 8	New England Middle Atlantic South Atlantic East North Central East South Contral West North Central West North Central Mountain Mountain Pacific	20,311 80,186 44,713 74,201 14,330 28,094 28,703 12,706 41,647	20,278 58,482 45,828 71,874 12,676 30,744 27,109 13,145 40,900	26, 202 88, 915 60, 723 106, 783 19, 984 39, 899 44, 825 18, 326 58, 138	216, 478 737, 120 484, 318 878, 751 163, 558 367, 031 342, 914 142, 160 452, 433	273,962 976,891 647,775 1,241,458 240,720 442,628 474,328 172,708 594,520	+ 0.16 + 2.95 - 2.43 + 3.24 + 13.05 - 6.62 + 6.53 - 3.34 + 1.83	-22.48 -32.31 -26.37 -30.51 -28.29 -29.59 -35.97 -30.67 -28.37	-20, 98 -24, 54 -23, 69 -29, 22 -32, 05 -17, 08 -27, 71 -17, 69 -23, 90
	Total United States	324,891	321,106	463,795	3,794,763	5,064,990	+ 1.18	-29.95	-25.08

States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt.

Zone 2—N. J., N. Y., Pa. Zone 3—Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va.

Zone 4—Ill., Ind., Mich., Ohio, Wis. Zone 5—Ala., Ky., Miss., Tenn. Zone 6—Iowa, Kan.,

1958 TRUCK FACTORY SALES BY G.V.W.

As reported by the Automobile Manufacturers Association

Period	6,000 lb. and less	6,001- 10,000 lb.	10,001- 14,000 lb.	14,001- 16,000 lb.	16,001- 19,500 lb.	19,501- 26,000 lb.	26,001- 33,000 lb.	33,000 lb. and over	Total
First Quarter Second Quarter Third Quarter	111,337	32,659	3,507	22,913	25,006	13,661	8,674	6,725	224,482
	104,198	33,127	3,804	23,112	26,619	14,025	6,984	7,996	219,865
	82,006	23,778	2,575	15,052	18,752	10,846	6,840	6,785	166,633
Total - Nine Months	297,540	99,564	9.886	61.077	70,377	38.532	22,498	21,506	610,980
	36,723	9,338	687	3,528	9,479	4,710	3,226	2,288	69,979
Total - Ten Months - 1958	334,263 448,022	98,902 134,228	10,573 32,163	64,605 138,997	79,356 60,934	43,242 45,273	25,724 32,672	23,794 29,153	680,959 921,442

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The R&S unit is mounted in the equipment that will run the field test, together with a portable 60 cycle power source. Sensing devices are installed to measure the engine variables that are to be reproduced on the test stand. We selected four parameters (engine speed, manifold air

pressure, oil temperature, and coolant temperature) as the significant factors for reproduction. Other... or more...parameters can be chosen.

Output from each sensing device passes through a transducer that converts it into a frequency signal. The four signals are amplified, mixed, and recorded on a single track of magnetic recording tape.

Back on the test stand the same sensing devices are

installed, and the same transducers are used, to read and report the actual condition of the engine on the test stand. The field-recorded tape is played back, through band-pass filters. Corresponding signals are passed through a frequency comparator circuit that discriminates the magnitude and the direction of difference between the signal that reports test engine condition and the signal that represents the recorded field test at the same point in the program.

Outputs from the comparator circuits control devices that bring the test engine into step with the field test record.

So successfully does the system overcome the prob-

lems of recording engine performance and reproducing engine performance that we regularly attain overall steady state accuracies of less than .5% error between recorded and playback operations.

We have fully recovered our investment in development costs through economies in our own operation. We are making the system available as a contribution

to automotive engineering and engine testing technology. Because each unit will make friends for us in places where it counts, the system is offered at a price ...\$9,500...that is a minor fraction of the costs you would incur in developing a system for your own use.

Components of the basic system will be available for use in constructing special automatic process control systems.

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Reduce design-to-production time.

PERFECT



CIRCLE

Don Mills, Ontario, Canada

Automobile Industry Heads into Better Year

(Continued from page 21)

Corp. cars, received the most extensive styling changes for 1959. And Plymouth is in its best competitive price position in several years. As a result, Plymouth should take a larger share of Corporation sales in 1959, probably topping 65 per cent. It will assume the role of "bread and butter" car for the company.

But General Motors should have a year of unprecedented success in the sales department. A total market penetration of 55 per cent is not unlikely. All five GM lines are new and all five were selling well during the early weeks of the model year.

Edsel, the Big Question of 1958, could become the Big Surprise of 1959. Edsel refined its styling and altered the items most criticized and lampooned in 1958, the front grille oval and rear deck and tail light arrangement. Edsel also trimmed its line and lowered prices, thus presenting a more saleable package. As 1958 entered its final month, Edsel increased its production schedule by 40 per cent to keep up with increased dealer orders.

Small Cars

Talk of "small car" that consumed so much printers' ink during the past 18 months has settled down into talk about a light car. It now appears that the Big Three goal is not to produce a small car like the Rambler American or the European imports of around 100 in. wheelbase. The cars, in their final conception, will evolve as light cars designed for ease of handling and economy of operation and, as a bonus, facility in parking and garaging. One of the primary goals will be to re-establish Chevrolet, Ford and Plymouth as the "lowpriced three" after several years of upward creeping and infringing on the middle-priced class.

As 1959 begins, automobile companies still contend that the final "go-ahead" has not been given to their respective small car programs. But the programs, nevertheless, are progressing at full speed. Some tooling orders have been let, and plant facilities are being readied for production. And, according to the latest reports, the first of the Big Three small cars will be in production and introduced before the end of 1959.

Wage Contracts

As a news story, the small car shared the spotlight with the recession and the labor negotiations during 1958, although much of the small car copy was based on speculation and "inside" reports. There is little doubt, however, that the labor stories were real. For the first time in history, the automobile companies stood together in facing the UAW's demands. As a result, the companies offered about the same thing and the final settlements, except for the Studebaker-Packard agreement, read just about the same. Wage packages for the next three years are practically identical. The only differences come in points of seniority, job transfer and severance.

Chrysler had a bit more trouble than the other companies. True, every one of GM's plants was shut down during October as union locals worked out local problems. But once the GM locals settled, production was smooth.

Chrysler, on the other hand, no sooner got its master agreement ratified than the UAW-represented salaried employes went on strike. The 8000 "white collar" workers were able to shut down the whole Corporation with their picket lines. Then, in early December, the Dodge plant went on strike. Chrysler appeared to be on its way to another era of periodic work stoppages, regardless of the new three-year contract.

Plant Changes

Chrysler, incidentally, started the 1959 production year with a new plant setup in the Detroit area. During the summer months the Corporation closed down the De Soto operation on Detroit's west side and moved De Soto assembly to the Chrysler Div. Jefferson plant.

Imperial then moved into one of the vacated De Soto plants and set up an independent operation all its own. The move gave Imperial more independence and De Soto less autonomy, pointing to the possibility of eventual dissolution of the division.

Also, during the year, Chrysler rearranged its organizational chart, moving William C. Newberg to the post of executive vice president and No. 2 man in the Corporation. Passenger car divisions lost a good bit of their identity in the shuffle. Under the new setup, the divisional heads are concerned mainly with sales, and the various manufacturing and plant managers report directly to the corporate staff.

Ford also rearranged its manufacturing operations during 1958, aligning all manufacturing plants into six divisions under the Power Train Group and the Body Group. More significant, perhaps, was the inclusion of Edsel with Mercury and Lincoln to form a single operating division, M-E-L Div. James Nance headed this new division until his retirement in September. He was succeeded by Ben D. Mills, who had been divisional assistant general manager.

The automobile industry saw another key personnel change in the summer. Harlow H. Curtice, General Motors president, chief executive officers and chairman of the Operations Policy Committee, retired upon reaching his 65th birthday. Curtice was succeeded by two men, Frederic G. Donner and John F. Gordon.

Donner, formerly executive vice president and chairman of the Financial Policy Committee, became full-time board chairman and chief executive officer. Gordon, formerly vice president and group executive in charge of the body and assembly divisions, became president and chief operations officer. The new "management team" arrangement actually made Donner top man and Gordon No. 2 in the Corporation.

Gordon was succeeded as body and assembly group head by James E. Goodman, who in turn was replaced as Fisher Body Div. general manager and vice president by E. C. Klotzburger.

(Turn to page 70, please)

ARISTOLOY

Electric Furnace Steels



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NEW CAR DESIGN

(Continued from page 23)

on the possibilities of smaller, lighter-weight aluminum engines in the not too distant future. The initial steps leading to this already have been made. Aluminum producers have been carrying on an extensive program of research and development of hypereutectic alloys which are said to promise aluminum engines without cylinder sleeves. Significantly too, the Ford Sheffield aluminum foundry and the Chevrolet Messana operation both hold promise of capability for producing aluminum engine castings. In each case the foundry is served by an adjacent Reynolds aluminum reduction plant which supplies molten metal directly to the foundry. Now each of these organizations has both the availability and assurance of a continued supply of raw material.

Smaller, lighter engines can surely mean lighter vehicles and lighter running gear components. Here too the aluminum suppliers made great strides in developing new applications such as front and rear bumpers, major castings, and body components. Wider employment of stainless steel and aluminum will work hand in hand with the drive to lower overall weight and thus achieve good performance with a small engine.

New Axles and Drives

Smaller engines and decreased overall car weight may well combine to usher in the next major development-either front drive or rear drive, largely in the interest of reducing or eliminating the tunnels that loom so large in the present day car. If these developments are too radical for the immediate future, then it is likely that one or more producers may switch to the so-called transaxle as an intermediate step. This will combine the transmission with the differential and will result in a major decrease in unsprung weight by suspending the entire unit from the underbody and employing independent suspension for the rear.

There was another noteworthy shift in emphasis stemming from price resistance. We refer to the new Ford-O-Matic transmission which is also available in the Edsel. It represents a regression in the interest of cost economy. This new version has but two forward speeds. The objective is to offer a lightweight, lower cost automatic transmission to those buyers who want an automatic drive but are willing to sacrifice some performance in favor of lower initial cost.

New Materials

Aluminum and stainless steel are not the only basic materials that bid for increased use in motor vehicles. For example, White Motor is now offering a handsome heavy duty truck cab made entirely of reinforced fiberglass plastic. This cab was developed for production by the Molded Fiber Glass Body Co., makers of Corvette plastic body parts.

More recently GMC Truck & Coach Div., announced its new heavy duty tractor models with air suspension standard. Both models have all-aluminum cabs and employ reinforced fiberglass fenders as do the new White models.

Meanwhile, modern cars have just about scraped bottom insofar as body height is concerned. Entrance and egress have become more of an adventure and the tunnels in many cars are so high as to make comfortable seating only for four passengers. Two serious approches were made for 1959 to remedy this situation. Mercury lengthened the wheelbase and moved the engine farther forward. This reduced driveline angularity materially, and aided in reducing tunnel height quite measurably. Chrysler, on the other hand, came out with swivel seats as optional equipment, standard on selected models. Here the passenger can seat himself before entering the vehicle.

Reduced Car Height

If the low silhouette persists, and stylists say it will, then something will have to be done by every car maker. One avenue is in the adoption of the transaxle, or rear engine location, or an integrated front drive. A simpler solution, if manufacturers are not yet ready to take the plunge, is to recess the doors into the roof panel. This is not the writer's invention; it is something that has been discussed in industry circles for a number of years. While the solution sounds simple, it has some headaches for body designers since they will have to find a foolproof way to seal the joint against the weather and water leaks.

Small Cars

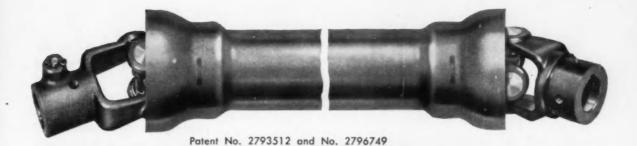
Last year when things still looked rosy because the economic business curve had not yet been drawn, we stressed the threat of foreign car competition. Although foreign car sales did not accelerate as much as some lay experts predicted, they did account for some 300,000 to 350,000 units in 1958. If business is as good as the signs foretell, producers may not worry too much about the small car situation. However, there is plenty of evidence that every producer is looking seriously at the small car.

Only a few months ago Chevrolet let it be known that they had tooling ready for making a small car. However, GM was taking a big look at the situation to determine definitely whether the time is ripe for launching a small car. The same questions still remain and will not bear more repetition. Meanwhile, S-P has launched its Lark in the small car field and we must say they have done an excellent job of making the Lark look and behave like a real automobile, even though the overall package is small.

If Chevrolet decides to launch the small car for the 1960 market, the scramble will really be on since all of the competition says it is ready to match the move. There may well be an exciting prospect in the offing. For if the majors all embark on a small car, they may find it expedient to preempt more production facilities for making it. And it could result in a swing away from large cars, except for the upper middle-priced and high-priced brackets.

Improved Accessories

In the area of accessories great improvement has been made in radio, heaters, and air conditioning. (Turn to page 70, please)



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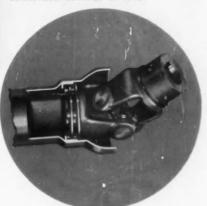
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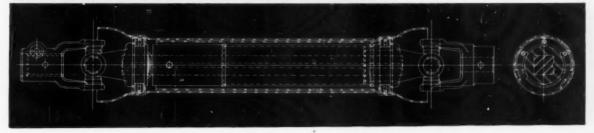
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News of the MACHINERY INDUSTRIES

By Charles A. Weinert

The 1958 Record and Outlook for 1959

Capital Expenditures

Plant and equipment expenditures by all U. S. business amounted to about 30.5 billion in 1958, according to latest estimates. This 1958 total is 82½ per cent of the "recordyear" 1957 outlay of close to \$37 billion.

Capital outlays of only those industries making durable and nondurable goods are estimated at \$11.5 billion for 1958—28 per cent less than the record \$16 billion spent in 1957.

Producers of motor vehicles and equipment (classified under durable-goods industries) spent an estimated \$577 million in 1958, versus \$1058 million in 1957, or 45 per cent less.

Capital expenditures in the 1st quarter of 1959, by all U. S. business, are expected to be a little above the annual rate of the 2nd half of 1958. They are anticipated to be at a seasonally-adjusted annual rate of \$30.5 billion in the 1st quarter, compared to less than \$30 billion in 2nd half 1958.

Makers of durable and non-durable goods expect to spend at the annual rate of \$11.06 billion in the 1st quarter of 1959—four per cent below the 1958 yearly total, but greater than 2nd half 1958's seasonally-adjusted annual rate of \$10.8 billion.

Capital expenditures by producers of motor vehicles and equipment in the 1st quarter of 1959 are anticipated to be \$119 million, equivalent to a seasonally-adjusted annual rate of \$550 million. This is likewise about four per cent below the 1958 yearly total, but more than 2nd half 1958's seasonally-adjusted annual rate of \$520 million.

From the figures presented, two

conclusions may be drawn. Capital expenditures of manufacturing industries in the 1st quarter of 1959 will be down as compared to those in the 1st half of 1958. The annual rates for these periods are respectively \$11.06 billion and \$12.3 billion. On the other hand, they will pick up, as indicated above, from what is now thought by some authorities to have been the low point in the decline—that which occurred in the 2nd half of 1958.

The foregoing data were obtained from report on a recent survey of investment intentions which was conducted jointly by the U. S. Department of Commerce and the Securities and Exchange Commission. Insofar as 4th quarter 1958, total 1958, and of course 1st quarter 1959 figures are concerned, the data are not conclusive. They were based on planned expenditures of business that were submitted between late October and early December.

Machine Tools

The machine tool industry is cautiously optimistic about the prospects for 1959, despite its having had, relatively speaking, a poor business year in 1958.

Dollarwise, the 1958 volumes of new orders and shipments were the lowest since 1949—without considering the inflated dollar. In terms of units, the quantity built was probably the lowest since the 30's—although here some consideration should be given to the trend toward a lesser number of bigger machines.

Final figures are not yet available, but our estimate of total 1958 machine tool *shipments* is as follows:

Predictions of Capital Expenditures in 1st Quarter are Favorable. Industries Producing Machine Tools, Gears, Tools and Dies Anticipate Moderate Improvements in Business

Metal cutting Forming type	\$404 106	million
1958 Total	\$510	+1

By comparison, the corresponding values of 1957 shipments were:

Metal cutting Forming type	\$844 244	million
1957 Total	\$1088	**

Shipments of both types of machine tools totaled \$1195 million in 1956.

The picture on estimated 1958 net new orders—gross new orders less cancellations—is about in the same proportion, as indicated below:

Metal cutting Forming type	\$273 r 87	nillio
1955 Total	\$360	**

Ir 1357 net new orders were:

Metal cutting Forming type	\$520 123	million
1957 Total	\$643	-01

In 1956 net new *orders* for both types of machines totaled \$1152 million.

As to the immediate future, a degree of optimism is felt by industry leaders, as exemplified by this statement by Ralph J. Kraut, president of the National Machine Tool Builders' Association and president of Giddings & Lewis Machine Tool Co.:

"The machine tool industry is emerging from the most serious depression it has experienced since the nineteen-thirties.

"After remaining at a consistently low level through most of 1958, new orders, at the latter part of the year, turned slightly upward. Various factors indicate a continuance of this trend.

"The first is the return of business confidence. The lag in machine tool buying was not due to lack of

(Turn to page 48, please)

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MACHINERY INDUSTRIES

(Continued from page 46)

need; a major share of the nation's metalworking equipment is obsolete and obviously in need of replacement. Machine tool users hesitated to make purchase commitments until they saw which way business was going. The current upturn in product sales, with resultant exhaustion of inventories, should revive plant modernization plans which have lain dormant.

"The second is the imperative need of reducing production costs. This is emphasized by continuing high wage rates here, plus the threat of invasion of American markets by products made abroad. It is commonly assumed that foreign-made goods can be sold at low prices because of the low wage rates in foreign countries. This is not the whole story. In Europe, in recent years, plant modernization, aided by accelerated depreciation allowances, has been progressing much faster in the United States. There is a higher degree of obsolescence in many of our metalworking plants than is the case in Europe. I can attest this by my own observations on a recent European trip. The need for correcting this situation will inevitably stimulate domestic machine tool purchases.

"The third is the accelerating program of product redesign and development which has been continuing within the machine tool industry. While sales have been down, attention has been focused upon research, invention and the practical application of new principles. Advances in automatic operation and in various types of controls are remarkable; with corresponding increase in productivity and reduction in production costs. With business confidence returning. manufacturers in the metalworking field will certainly take advantage of the opportunities offered by the machine tool models of 1959.

"I would not venture a prediction as to how rapidly a substantial upturn in machine tool sales will develop—but I believe it is on the way."

Gears

The gear producers are likewise optimistic that 1959 will bring a moderate improvement in business. The situation in 1958 and what is likely to occur in 1959 are described by John C. Sears, executive director, American Gear Manufacturers Association, as follows:

"In 1958 the gear industry sustained a 20 per cent drop in business compared to that obtained in 1957. Using the period 1947-49 as 100, we estimate 1958 will wind up at about 170.

"However, this is 1958 dollars compared with 1947-49 dollars. Productive capacity during the 10-year period was about doubled, thus when we apply the "inflation factors" we have reason to believe we operated in 1958 at a rate of about 50 per cent as related to base period operations.

"The outlook for 1959 is slightly better. We expect a 5 to 10 per cent increase in dollar volume, somewhat less numerically in production output."

Tools and Dies

The contract tool and die manufacturers also anticipate moderately-better business in 1959, with gains of perhaps 15 per cent. The outlook is expressed this way by George S. Eaton, executive vice-president of the National Tool & Die Manufacturers Association:

"While a sharp upturn in new orders last fall has given grounds for some optimism regarding 1959 business in the special tool and die industry, no sudden major improvement is anticipated by representative leaders of the industry.

"Rather, an increase nationally in the value of shipments in 1959, over 1958, of about 15 per cent is all that can now be foreseen. In fact, some tool and die manufacturers look for no increase or even a small decline.

"On the other hand, the outlook could change for the better within a few months' time, depending upon decisions of metalworking and plastic manufacturers as regards bringing out new or revamped models.

"A gain of only 15 per cent would still leave the industry depressed, as that would merely bring it back within 15 per cent of the levels attained in 1957, a reasonably good year but no better than the average for the preceding five years.

"The automotive industry no doubt is the largest single user of special tooling, and indications so far are that 1959 will not be a year of general major changes. This means that the outlook for business is not very good in the Detroit area, which is by far the most important special tooling center.

"During the past year, probably the brightest spot for tooling has been the farm equipment field. And the indications are that the upturn in sales of farm equipment will continue. The question, however, is how fully have the manufacturers already retooled?

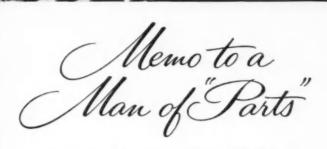
"Since the low point in incoming orders was reached last August, they have definitely picked up and further improvement is expected at least during the first half of 1959. The gain in October orders over those received in August appears to have been about 40 per cent. No surge of orders is anticipated, however, and the general expectation seems to be an average increase of only about 15 per cent for 1959 . . . unless the sales policies of the mass-production manufacturers are revised to include more model changes."

Headquarters Move In Prospect for NMTBA

A shift of office location from Cleveland to Washington, D. C., is being planned by the National Machine Tool Builders' Association.

While the action has been approved by the Association's directors, no exact date has as yet been set for the move. It is conditional on sub-leasing of the present quarters in Cleveland. Association officials are hopeful the relocation can be consummated by the latter part of this year.

AUTOMOTIVE INDUSTRIES
KEEPS YOU INFORMED



The number of different parts made from Roebling High Carbon Specialties, Flat Wire and Spring Steel are close to countless.

Some things you can count on, though, are the consistent dimensional and mechanical uniformity you get with any Roebling High Carbon Specialty. They are the qualities that contribute to speeding *your* production and cutting *your* costs.

They are high qualities that make for high values. Next time you need flat wire or spring steel, specify Roebling. Write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

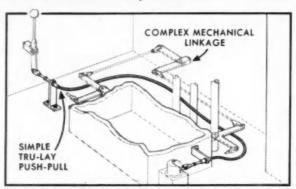
ROEBLING

Branch Offices in Principal Cities

Roebling ... Your Product is Better for it

WITH TRU-LAY PUSH-PULL controls, you can ___ MAKE HUNDREDS OF PRODUCTS MORE USEFUL, EASIER TO SELL

Tru-Lay Push-Pull controls provide positive remote action over long or short distances. Because they operate while flexing, they can snake around obstructions. They are ruggedly constructed, easily installed and operated, and are sealed against dirt and moisture. Push-Pulls are simple, have but one moving part, are noiseless, and give a lifetime of accuracy. Linkages, on the other hand, are complex. They're made of many parts, wear at many points, and produce increased backlash, lost accuracy, and vibration rattles.



Here's Why Push-Pull Controls Simplify Design, Give Better Performance

Long Life — We have never heard of a Tru-Lay Push-Pull wearing out in normal service.

Dependable Operation—Top performance under the most adverse conditions...in temperatures ranging from -70° F to the high levels of jet engine operation...in wet locations...in abrasive atmospheres.

Freedom from Trouble—Inner working member is fully protected by tough, flexible conduit...lifetime factory lubrication...sealed against entrance of dirt, moisture, and other foreign matter...cold swaging of all fittings.

Accuracy—Built to the most exact standards of quality and precision. On automobile pushbutton transmissions, for instance, Push-Pull controls provide five positions with a total movement of only .560".

Capacity—Push-Pull controls will handle jobs with as much as 1,000 lbs. input, 150 feet or more from the control point.

Adaptability—Push-Pull controls can be adapted to countless applications. Standard anchorages, fittings, and heads meet almost any requirement, and modifications can be made to fit special situations.

Design Engineers Report on Benefits

Saves Time, Labor, and Material

"We use Push-Pulls to operate clutch controls on the main power unit, feed conveyors, and delivery conveyors...and we save the time, labor, and material required for planning and engineering the old linkages."

Greater Flexibility of Design

"Push-Pulls give us flexibility in locating the hydraulic control valve in relation to the operator's position."

Cost Less to Install

"They are easier and less expensive to install than linkages for remote control of power take-off."

Solution to Tough Problem

"Can be installed where straight rods are impossible."

Eliminates Maintenance

"No maintenance whatsoever; not even lubrication is required."

Reduces Number of Parts

"Your Push-Pulls have eliminated links, radius rods, and other lost-motion devices for remote control of hydraulic valves."

Provide Accurate Control

"We get minimum backlash because the cable is designed to close tolerances with minimum drag and lost motion."

Push-Pulls Can Help Solve YOUR Remote Control Problems



Push-Pull controls are solid as a rod and flexible as a wire rope. You can use them in the electrical, hydraulic, and pneumatic systems on construction equipment, on farm implements...almost anywhere convenient remote control is desired. For complete details on how you can use them, write for a copy of the Push-Pull Data File. It contains 7 bulletins which describe in detail the operation of Push-Pulls, their applications, features, and advantages. Our engineers will be glad to help you make Tru-Lay Push-Pull controls a part of your product.

Automotive and Aircraft Division
AMERICAN CHAIN & CABLE

600-H East Acco Street, Los Angeles 22 ° 929-H Connecticut Ave., Bridgeport 2, Conn.
Circle 118 on Inquiry Card, for more Data



High Production of Automobile Crankshaft Forgings on AJAX High Speed Forging Presses

Production
More than Doubled
Over Former Methods
on 6000 Ton
Ajax Forging Presses

Crankshafts
With Less Draft
on Counterweights
for Lower Machining
Costs

For Your
Forging Needs . . .
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Sizes 300 Ton
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Write for Bulletin 75 C



PRODUCTION EQUIPMENT

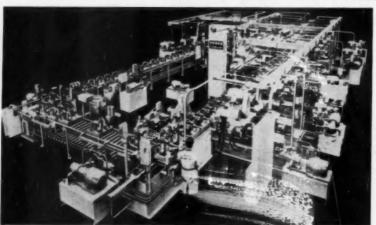
FOR ADDITIONAL INFORMATION, please use reply card at back of issue

Tape Search Feature For Automatic Selection



This Bendix tape search feature shown mounted on a Bendix machine control unit rns dendix rape search redurer shown mounted on a Bendix machine control unit provides automatic selection of up to 100 specific parts sequenced on one reel of tape, selection of up to 100 part reference points during the machining of a specific part and up to 80 auxiliary on-off control functions. (Industrial Controls Section, Bendix Aviation Corp.)

Circle 30 on postcard for more data



Cross Transfer-Matic performs 66 operations on steering gear housings

Sectionized Transfer-Matic For Steering Gear Housings

M ost of the machining and inspection operations on a hydraulic steering gear housing have been combined in a sectionized, pallet-type transfer-matic designed by The Cross Co. Sixty-six operations are per-

formed on each part as it passes through the 55 machine stations. Rated capacity of the machine is 200 pieces per hour when operating at 100 per cent efficiency.

Circle 31 on postcard for more data

Weld Roller

THE #2-LC weld roller is a com-bination dual purpose longitudinalcircumferential weld roller which develops great force at the rolls (25 tons at top pressure of 1000 psi) for the smooth and fast rolling of both butt and lap seams. The machine is hydraulically operated. Rolled welds are flattened to the thickness of the parent metal and the parts can be processed without any further work on the welds.

The longitudinal end of the machine rolls welds on parts with diameters ranging from 51/4 in. minimum to 36 in. maximum, with one pass rolling on work up to 141/4 in. long with a minimum diameter of 51/4, and up to 181/2 in. long on pieces with diameters greater than 8 in. OD. Grotnes Machine Works.

Circle 32 on postcard for more data

Transistorized Gages

A LINE of measuring instruments called Trans-O-Limit Gages features completely transistorized circuits and four separate magnifications, easily selected by a switch.

The gages operate at 5000 cps and measure optionally in thousandths, ten-thousandths or in millions.

The line consists of a cabinet containing power unit and indicating meter, which can be used with the



Pratt & Whitney Trans-O-Limit height gage

height gage (shown), external comparators, snap gages or cartridge units. The Pratt & Whitney Co., Inc.

Circle 33 on postcard for more data

Heat Treat Furnace

Surface Combustion Corp. has designed a heat treating furnace which can handle three coils at a time, each weighing 550 lb. The coils are components of electric motor commutators.

The pit type furnace has a temperature range of from 400 to 1800 F. Typical coils are 26 in. in diameter. The heat treatment is specified to furnish required surface finish, physical and electrical properties to the copper alloy coils.

Circle 34 on postcard for more data

Ultrasonic Seam Welder

This ultrasonic seam welder can weld sheets of dissimilar metal continuously. Sheets of metal to be welded are passed through two wheels vibrating at 20 kilocycles per second. The periphery of the wheels press against the metals on opposite sides of the sheets. At the point of contact, the wheels break up the oxide coating on the metal surfaces and by a kneading action weld the metal lattices on the surfaces of the metals themselves. No electric current is



Westinghouse seam welder

passed through the spot being welded although in appearance the ultrasonic seam weld is similar to that of an electric weld. A variable speed drive moves the metals through the unit as the weld is completed by means of vibrating wheels. Westinghouse Electric Corp.

Circle 35 on postcard for more data



Monarch Series 180 ultra-precision contouring lathe has speed range of 81/2 to 1000 rpm

Ultra-Precision Contouring Lathe

YONTOUR tracing to ultra-precision Controls tracing to accomplished with the Monarch Series 180 contouring lathe. It is a chucking type lathe intended for the OD and ID machining of thin wall spherical and related shape work pieces. Diameter range which may be contoured is 5 to 15 in.

Total speed range is 81/2 to 1000 rpm. Spindle bearing lubricant is refrigeration cooled, to keep the spindle substantially at room temperature. An electro-hydraulic tracing system controls slide position within 20 millionths while tracing around a template. This is the total accumulated error from the tracer stylus to the tool point.

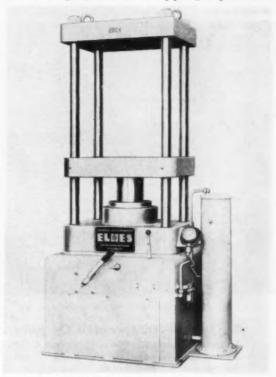
Electrical control of the machine is from a console which may be located convenient to the operator. To assure performance, the unit is built and tested in a temperature controlled area. It must also be used in such an area. The Monarch Machine Tool

Circle 36 on postcard for more data

Press With Double-Acting Ram For Stripping Operation

The Elmes Hydrolain is an air powered hydraulic press designed for small - production work and testing and research applications in the fields of plastics molding, laminating, compacting, assembly, etc. The unit takes its power from shop air lines. Where the ram on the standard Hydrolair is single-acting, this special unit is equipped with a double-acting ram, providing a stripping force. This press is a manually operated type, with 125-ton capacity and 15-ton stripping capacity, us-ing a shop air pres-





Tooth Topping Machine For Spiral Bevel Gears



This tooth topping machine is designed to remove nicks and sawtooth edges from the pinion teeth of spiral bevel gears before they go into heat treatment. To top a pinion, it is placed on the driver locater in the center of the machine. It is held with the right hand so that the tooth faces bear against the drivers. Clamping is pneu-matic. When the unit starts, the work tilts into cutting position. Cycle time for a 10tooth pinion is about 10 seconds. Change gears at the left of the machine provide the necessary adjust-ments for pinions of different ratios. The machine can handle both right and left hand pinions by reversing the master control switch in the control panel at the rear. (Modern Indus-trial Engineering Co.) Circle 35 on postcard for more data

Both rough and finish passes are integrally controlled permitting automatic sequencing from rough to finish passes without the necessity of removing the work piece from between centers.

Carriage travel and diameter of

Carriage travel and diameter of cuts for each pass with the tracer carriage are controlled by manually set dials mounted on the machine. A start position, end cut and specific diameter are set for each pass. The machine will sequence automatically through as many as nine distinct roughing and semi-finish passes before proceeding automatically to the finish cut.

The system is available with both Model LQ and AQ lathes. Seneca Falls Machine Co.

Circle 39 on postcard for more data

Engine Analyzer



Shown is the Du Mont TV-type EnginScape being operated from a car's battery for on-the-road testing. This device offers on exclusive multi-line pattern in which each cylinder operation, from the firing of the spark to the "points open" condition, is shown on the instrument's picture screen, one line directly below the other, in the exact firing order of the engine. (Allen 8. Du Mont Laboratories. Inc.)

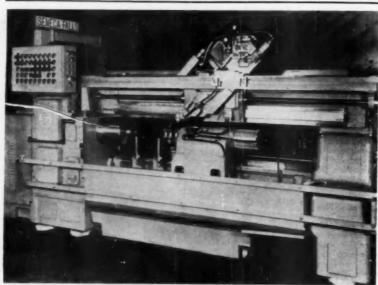
Circle 40 on postcard for more data

Gear-Rolling Fixture

A Low cost bench type gear-rolling fixture for accurately checking external spur and helical gears provides checking equipment covering the most-used range of gear sizes. Named Model 607, the unit will check size, eccentricity and meshing smoothness of external spur and helical gears up to 10 in. in diameter.

All deflections are shown on an integrated dial indicator in increments of 0.0005 in. The master gear assembly is spring-loaded, and rides on hardened and ground ball bearing ways. A hand-actuated cam disengages the meshing action and permits easy removal of the gear from the fixture. Michigan Tool Co.

Circle 41 on postcard for more data (Turn to page 56, please)

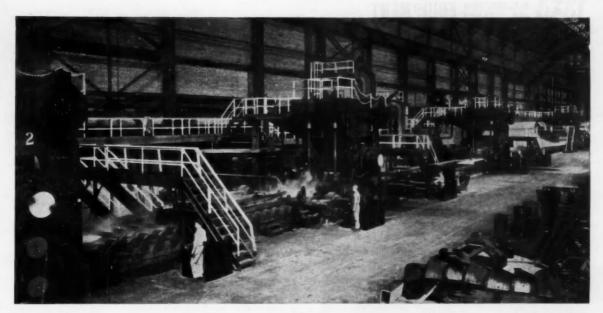


Seneca Falls dial system enables operators to "dial" set-up changes

Dial System Incorporated On Automatic Lathes

Incorporation of a pre-selector machine management system into a line of lathes enables operators to

dial set-up changes. The system reduces set-up time and is therefore suitable for short run operations.



On these giant sheet mills we measure in 000ths



Shown at the top is the 68-in. continuous hot mill at our Sparrows Point, Md., plant. Entering this mill as slabs several inches thick, hot steel whizzes through at ever-increasing speeds until it emerges as hot-rolled sheet at speeds up to 2120 ft per min. The finest hot-rolled sheet steel you can buy!

Some of this hot-rolled steel is further reduced cold at still higher speeds for use in automobile body stampings and a host of other applications. Typical of Bethlehem's up-to-the-minute facilities is the 54-inch cold mill at our Lackawanna, N. Y., plant (lower photo).

Massive though these mills are, experienced operators control thickness tolerances within a very few thousandths of an inch! And all along the line, Bethlehem sheets are carefully checked to insure uniformity of gage, surface, weight and mechanical properties.

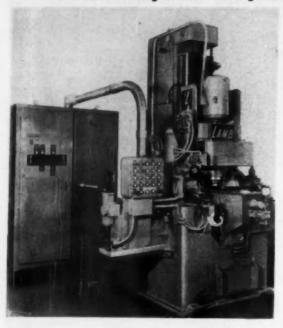
BETHLEHEM STEEL COMPANY, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Expart Distributor Bethlehem Steel Expart Corporation

BETHLEHEM STEEL



Piston Weight Boss Milling Machine



Transfer machine de-sign features applied to this special piston weight boss milling machine provide production rate of 425 pistons per hour. The machine loads, orients. clamps, mills, clears chips and unloads in a completely auto-matic cycle. Two size pistons can be accom-modated with inter-changeable tooling. A trap type rotary transfer mechanism pre-vents station override on the unit. JIC standards are met on all hydraulic and electric components. (F. Jos. Lamb Co.) Circle 42 on postcard for more data

work level, achieves a high degree of rigidity and provides a large diameter boring-type quill which is hardened, ground and lapped to a close fit in the head.

Any desired hole pattern can be quickly set up on the spacer table by the use of micrometers within a range of 14 by 18 in. with one setting of the drill head. The automatic cycle positioning of the table from hole to hole is done with a bushbutton and locating pins. Quick tool changes are facilitated by the automatic toll ejector built into the spindle. Veet Industries.

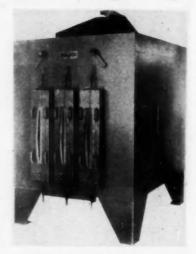
Circle 43 on postcard for more data

Propeller Tip Furnace

SPLIT front removeable doors hold jig supported propeller tips to prevent warping in this air re-circulating furnace designed for annealing and stress relieving of aircraft propeller tips. Propellers are inserted into door openings and supported by jigs prior to insertion into the fur-



Veet precision spacer table on a Veet precision radial drill will hold hole locations to 0.001 in. limits working directly from blueprints. Any desired hole pattern can be quickly set up on the spacer table by the use of micrometers within a range of 14 by 18 in. with one setting of the drill head.



Trent furnace for propeller tips.

nace. Maximum temperature is 1400 F. Specifications: 54 kw, 460 v, 3 phase, 60 cycles. Trent, Inc.

Circle 44 on postcard for more data

Close Corner Drill

Thor Power Tool Co. has developed an air-powered drill for close corner work which weighs only 5 lb. Named No. 3RD1-450, the drill has a speed of 450 rpm, drilling capacity of 9/16 in. reaming and tapping capacity of % in.

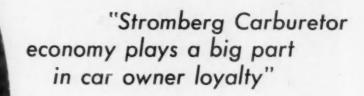
Circle 45 on postcard for more data (Turn to page 58, please)

Combination Spacer Table And Radial Drill

This combination precision spacer table and precision radial drill produces duplicate parts with a high

degree of accuracy without the use of expensive jigs and fixtures.

The drill, with column anchored at



"You know, the average car owner blames the carburetor for stalls and starting troubles . . . and also for poor gas mileage. And he blames not only the carburetor . . . but the car manufacturer, too—for this kind of performance."

"Right . . . and it seems to me that the best way to hold owner loyalty is to supply STROMBERG* carburetors as original equipment. You can't beat a STROMBERG for economy, reliability and efficiency. It's a Bendix-Elmira product—and they've been the leader in automotive fuel systems for fifty years."

*REG. U. S. PAT. OFF

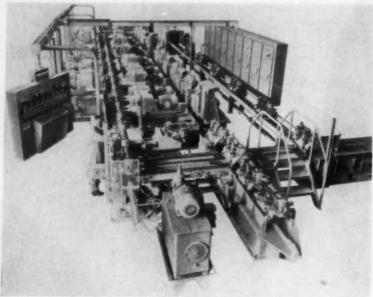
Bendix-Elmira

ELMIRA, NEW YORK



Circle 121 on Inquiry Card, for more Data

PRODUCTION EQUIPMENT



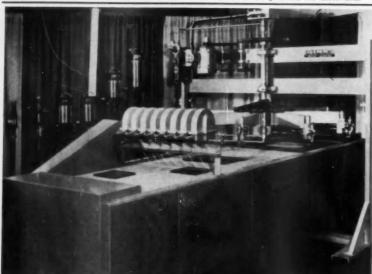
Buhr 26-station Economatic holds close tolerances while producing parts in 24-seconds

Precision Machining On A Transfer Machine

Not all of the 115 operations done by this 26 station Economatic can be listed as "precision machining" but some tool diameters and some product dimensions including the flatness of a recessed step are held to dimensions specified in tenths of a thousandth. Smoothness, in some cases, is held to 70 microinches rms.

To facilitate tool and fixture maintenance, three tool control boards have been located strategically within the machine. These boards have built-in gages so that all tools can be present. Interruptions of production for tool changes are kept to a minimum. Buhr Machine Tool Co.

Circle 46 on postcard for more data



Binks mechanical timer for use with automatic spraying machines

Mechanical Timer For Use With Automatic Spray Units

DEVELOPMENT of a control mechanism, for use on either rotary or

vertical and horizontal automatic spraying machines to reduce overspray and material loss, has been announced by the Binks Mfg. Co.

The electro-mechanical control timer is designed to control individual spray guns so that the spray pattern follows the outline of the product and actuates the guns only when there is a surface to be sprayed. The control can be adapted to existing reciprocating or rotary spray machines.

Circle 47 on postcard for more data

High-Speed Inserting Unit

A HIGH-SPEED machine has been designed to automatically install wire thread inserts and break off the driving tang in a complex one-piece aluminum automatic transmission case and converter housing. The machine is equipped with two separate stations: one loads, aligns and simultaneously drives three Heli-Coil inserts while the second breaks and catches the driving tang. Heli-Coil Corp.

Circle 45 on postcard for more data

Hydraulic Bench Presses

Dual hand and adjustable downstroke controls are standard on a line of 6 and 8 ton high speed hydraulic bench presses designed for forming, trimming and force-fit assembly operations.

The presses stand 55 in. above the bench surface and are mounted on a 19 by 38 in. base plate. They have a



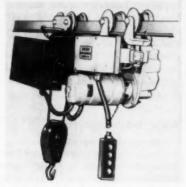
Hannifin high-speed, hydraulic bench press

12 in. stroke; 8 in. reach from throat of frame to centerline of ram, and 18 in. gap. They can be supplied with an index table for automatic operation. Hannifin Co.

Circle 49 on postcard for more data

Monorail Drive Unit

THE Unitractor, an electric powered monorail drive unit, is designed to provide powered travel for hoists or other load carriers along a monorail



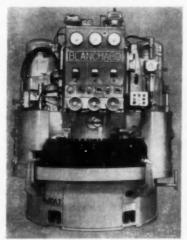
Becker Unitractor monorail drive unit

system. The unit will handle live loads up to five tons at travel speeds up to 2000 fpm. Becker Crane & Conveyor Co.

Circle 50 on postcard for more data

Automatic Surface Grinder

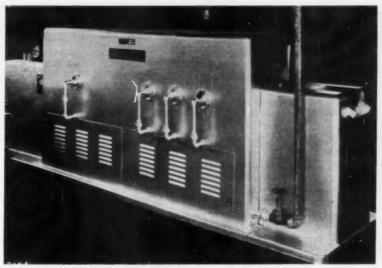
Designated as the Blanchard 80-A3, this center column automatic surface grinder has an 80 in. OD work table and three grinding wheel spindles. Each wheel is maintained at correct height by a "finger-type" feed control caliper. Since the work table is nonmagnetic, all parts are held in



Blanchard 80-A3 automatic surface grinder.

fixtures during the grinding cycle. The machine pictured is used to rough grind both sides of both ends of automotive connecting rods. The Blanchard Machine Co.

Circle 51 on postcard for more data



Waltz custom-made continuous furnace anneals brass stampings

Continuous Furnace Anneals Brass Stampings

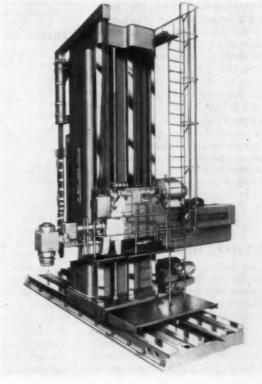
This continuous annealing furnace has been developed to anneal brass stampings between draws. It is fired by eight burners with individual mixers. The combustion chamber, control valve, gas regulator, and variable drive mechanism are mounted within

the casing. The small rubber-tired wheel at the extreme left drives the belt by pressing against a large ball bearing-mounted idler pulley. The temperature control instrument is left of load station. Waltz Furnace Co. Circle 52 on postered for more data

Horizontal Boring, Drilling And Milling Machines

The 80 series horizonboring, drilling milling machines, with an eight or ten inch diameter spindle, feature vertical headstock travel in excess of 20 ft., heavy-duty welded steel construction and new operating advantages. Illustrated is the Model 880-FUAR floor-type with an underarm. has an eight inch diameter spindle, 84 in. spindle underarm trav-el, and 20 in. column travel. (Giddings & Lewis Machine Tool Co.)

Circle 53 on postcard for more data



Aircraft Hydraulics Conference

(Continued from page 37)

design objective being five seconds. Rapid landing gear retraction and aerodynamic clean-up permit faster acceleration and are considered especially advantageous on short hauls. The arrangement also provides a longer period of parking brake holding. The accumulator system also is effective in providing automatic braking during main landing gear retraction. The back pressure resulting from high flow rates is utilized in this instance to apply the brakes.

Boeing 707

Still another kind of configuration is found in the hydraulic system for the Boeing 707. Here the utility system is powered from two variable volume 3000-psi pumps, mounted on engines No. 2 and No. 3. This is supplemented by an auxiliary system powered from an AC, electrically-driven 3-gpm, 3000psi pump furnished power to the inboard wing spoilers and rudder power control system. In addition, the auxiliary pump can be used for ground check-out of the entire hydraulic system through an interconnect valve operable only on the

Hydraulic operation extends to retraction of main and nose landing gear; operation of the wing flap system; wing leading edge flaps; wing spoilers; nose wheel steering; rudder power control on some models; wheel brakes; engine starter air compressor. The normal brake system incorporates an anti-skid arrangement which prevents tire blow-out due to skids. The emergency brake system is separated from the normal system, operates from stored compressed air.

Sikorsky HR2S-1

According to E. R. Vianney, Sikorsky Aircraft, the newer helicopters such as the HR2S-1 depend entirely upon hydraulic system actuation due to their size. Here is an aircraft of over 30,000 lb gross weight with 72-ft diameter rotor blades having high control system forces. The hydraulic system in-

cludes two primary servos installed below the stationary star, with their housings mounted on the main rotor transmission while the second stage has its pump driven from the right hand engine. Since the tail rotor forces also are high, another tandem servo is mounted within the tail rotor gear box. Its two stages are powered by the systems serving the main rotor servos.

In addition, a hydraulic damper mounted in parallel with the pilot's pedals provides feel on the pedals, matches the time constant in the yaw mode. This unit operates from the utility system variable delivery pump mounted on the left-hand engine. Another servo, to boost the pilot's throttle grip input, is powered from the same source.

Still another hydraulic system, tied in closely with the function of blade folding, is the taxi system. Power is obtained from two Vickers pumps, one mounted on each engine. Taxi drive units are kept on the ground and rapidly attached by locking to the wheel axle spline and connecting through hydraulic quick disconnects.

Future Requirements

A series of papers dealing with future requirements in the light of high performance airplanes, missiles, and space vehicles also were presented to the group. An appraisal of the next 10 years in fluid power was given by W. Bobier of Vickers. He turned his attention first to the supersonic transport aircraft which will operate at speeds ranging upward to Mach 3. Such aircraft are anticipated by 1965. The B-70 and F-108 military programs will determine to a large extent when the Mach 3 transport becomes of age.

The fluid power system in such transports will be considerably larger than in present day jets. Moreover, they will be required to operate at a continuous environment in excess of 500 F. Vast amounts of power will be required for refrigeration and cooling and this will undoubtedly result in using engine-driven hydraulic pumps

for starting as well. Under these conditions the Mach 3 airplanes will place extreme emphasis upon long life and reliability in their hydraulic systems.

Further in the future, Bobier visualizes still higher Mach numbers up to Mach 6 and into the range of orbital vehicles such as boost glide types of manned craft. Power from the prime propulsion system generally will not be available throughout flight and when the vehicle is orbiting, the secondary power system will be the only power source available.

New Developments

Vickers also reported on many new development programs leading to advance designs of higher performance and increased reliability. Among these are: higher temperature operation; higher speed units; higher pressure units; clean pumps; contaminant tolerant pumps A new series of pumps and motors for aircraft feature variable displacement models with more than double the horsepower per pound of unit weight, along with a reduction in weight of approximately 15 per cent. Rated speed has been doubled and maximum pressure upped two-thirds. Minimum life expectancy has gone from 560 hours to 750 hours.

During the Conference Eastern Air Lines proposed a design concept which would provide equipment suitable for military operations in time of war and commercial operation in time of peace. The point is that military specifications do not stress the basic items most important to best airline operation since the military concept is one of expandable equipment rather than low operating cost and long life dependability.

Many times, the difference between "expendable" equipment and what is desirable for commercial services is quite small. Increases in safety and durability could be achieved by suitable design, somewhat higher cost, and with some slight increase in weight. The new design concept could provide equipment, which without major modification, could be simplified, lightened, and cheapened readily for high production during a national emergency.

NEW PRODUCTS AUTOMOTIVE - AVIATION

FOR ADDITIONAL INFORMATION, please use reply card at back of issue=

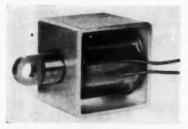
Plastic Pumps

A line of all-plastic centrifugal pumps is constructed with all wetted parts of unplasticized, unmodified polyvinyl chloride, offering a wide range of chemical resistance as well as the non-contaminating transfer of sensitive solution. Available in four sizes, these units offer capacities from 10 to 180 gpm with discharge heads to 100 ft. Solution temperatures to 140 F can be handled. Vanton Pump & Equipment Corp.

Circle 80 on postcard for more data

Long Life Solenoids

A line of "long life" solenoids, designed for 100 million or more operations, has been introduced by the Automatic Switch Co. The unit utilizes a machine tool type bearing as a



plunger guide to provide almost unlimited solenoid life. Wear is further decreased by the precision fit of the guide and plunger.

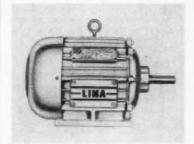
Circle 81 on postcard for more data

Explosion-Proof Motors

Lima type EX explosion-proof motors approved for Class 1, Group D and Class 11. Groups F and G service are now supplied in NEMA standard frames Nos. 182 through 326U These NEMA frame assignments accommodate standard ratings of 1 through 40 hp, either 3 or 2 phase, in all commercial frequencies and voltages below 600.

The motors are approved for use in locations where hazardous gasoline, petroleum, alcohols, etc., are present.

The frames incorporate deep, integrally cast fins that provide extra cooling surface for rapid heat dissipation. The design eliminates all



corners, pockets and air passages which could become clogged and retard cooling and motor efficiency. A specially designed external fan forces air at high velocity over the outside of the motor to provide constant cooling and a self-cleaning action. The Lima Electric Co., Inc.

Circle 82 on postcard for more data

Silicone Rubber

Dow Corning has developed a fast sealing Silicone rubber. Identified as Silastic RTV 502, it is an easy to apply liquid that vulcanizes to a rubber in 30 minutes.

Silastic RTV 502 retains flexibility from -70 to 500 F and has good electrical insulating properties. It also resists weathering, moisture, ozone and corona. It is suitable for sealing and caulking metal-to-metal and metal-to-rubber joints; potting and encapsulating electrical and electronic parts; as a mold or impression material for making prototype parts; as a shock and vibration absorber for delicate components. Dow Corning Corp.

Circle 83 on postcard for more data

Immersion Pump

The Linde HP-8 immersion pump is designed to deliver liquid oxygen and nitrogen at high pressures. It is for use in the missile and rocket industry. The pump can deliver 11,000 standard cubic feet of nitrogen per hour and delivers oxygen at a rate of 13,750 sefh at 10,000 psi.

The HP-8 is a reciprocating, singleaction, positive displacement type pump designed for storage tank operation. The drive for the pump is a 15 hp. 440 v. 60 cycle ac electrical motor. Its speed is 1750 rpm with a 1:8 reduction gear. Linde Co., Div. of Union Carbide.

Circle 84 on postcard for more data

Switch Assemblies

A series of push button switch assemblies-incorporating an electronic circuit to produce a single, microsecond-length pulse with each operation-has been introduced by Micro Switch, a Div. of Minneapolis-Honeywell Regulator Co.

Designated 1PB600, the devices are said to eliminate the need for designing special pulse input circuits for high-speed electronic switching devices. The square wave pulse width is factory adjustable from 0.2 to 2.5 microseconds, and the amplitude from 3 to 60 volts.

Both width and amplitude are independent of the speed of switch operation. No standby power is required. They are designed to operate in a temperature range of minus 65 to plus 185 F and are for use in electronic test circuits, keyboard input consoles, fusing, arming and firing circuits, and reflected pulse systems.

Circle 85 on postcard for more data

Drop-Center Axle

Designed for use with a single drive axle to produce a pusher type driving tandem, this TK-500 dropcenter axle is said to give trucks and tractors all of the payload advantages of a driving tandem with less weight.

Ample room for propeller shaft clearance is provided. Transmission and Axle Div. of Rockwell-Standard

Circle 86 on postcard for more data

One Piece Torque Locknut

A one-piece reusable prevailing torque locknut whish obtains its locking characteristics by preforming the



threads in the locking section has been developed. Three sectors of the tapered portion of the Comelok Nut are preformed inwardly. When the nut is applied to a bolt, these conforming sectors are elastically returned to a circular conguration and create an inward and downward pressure which produces intimate contact between the load carrying flanks of the nut and bolt threads. The shape of cone sector displacement insures conformity with the mating bolt and maximum friction contact area. National Machine Products Co.

Circle 87 on postcard for more data

Square Head Air Cylinder

An interchangeable air cylinder of square head design has been designed to produce maximum force with minimum pressures and is also adaptable to the use of low pressure oil as the working medium. Named the T-J Square Head Cylinder, it is available cushioned or non-cushioned and comes in various standard bore diameters.

It is designed to utilize up to 200 psi air or 500 psi oil pressure, and is interchangeable with all standard JIC cylinders. *Tomkins-Johnson Co.*

Circle 88 on postcard for more data

Expanding Wheel

An expanding grinding and polishing wheel made of rubber and using coated abrasive bands has been announced. The wheels, composed of metal hubs to which rubber is molded, eliminate the need for bac'standidlers in the use of coated abrasives. The abrasive band is fitted loosely around the wheel while at rest. When the wheel is brought to operating

speed, centrifugal force causes it to expand and grip the band. Mermac Products, Inc.

Circle 89 on postcard for more data

Variable Speed Drive

This packaged variable speed drive has been designed for agitators and mixer duty. Designated U. S. Vertical Varidrive-Syncro-gear, the unit combines in a single integrated unit a high speed ac motor, a mechanical type variable speed transmission and double reduction gearing.

Several different methods of speed control are available; a handwheel on the unit, remote mechanical, remote electrical or Varitrol Automatic Control. With Varitol, the speed of the



drive can be automatically adjusted to meet any change in viscosity of material being mixed. U. S. Electrical Motors, Inc.

Circle 90 on postcard for more data

Flame-Retardant Laminate

Fireban 321 is a paper-base, plastic laminate which is self-extinguishing when set afire. It has high insulation resistance, low dielectric losses, low water absorption and good fabricating qualities. The material is expected to have wide use wherever flame retardance is an important consideration. Fireban 321 is made with a special phenolic resin and is offered in sheets approximately 49 by 49 in. and from 0.020 to ¼ in. thick. Taylor Fibre Co.

Circle 91 on postcard for more data

New Hydraulic Pump

Less horsepower drain on the engines of tanks, weapon carriers, landing craft, missile ground-handling support vehicles, launchers, transporterectors, etc., is an important feature of a new high-performance hydraulic drain pump. This low drain releases engine hp for other uses or, in borderline cases, permits the use of smaller engines.

Developed to meet the trend toward higher engine speeds and increased hydraulic circuit pressures on mobile equipment, the pumps operate at speeds up to 2000 rpm and pressures up to 2000 psi. Vickers Inc.

Circle 92 on postcard for more data

Toolholder Seats

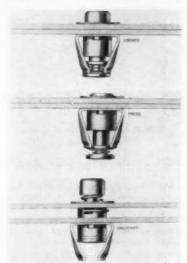
Convertible seats announced by the Metallurgical Products Dept. of General Electric Co. make possible instant conversion of standard triangular insert toolholders into universal-type holders. The seats reduce toolholder inventories and permit lighter or heavier inserts to be used in the same toolholder without altering the tool setup or removing the holder.

Nine new convertible seats are available to adapt Lift-O-Matic toolholders for inserts % in. through % in. down to smaller sizes or other thicknesses

Circle 93 on postcard for more data

Quick Release Fastener

Pres-Loc fasteners can be used for securing inspection ports, modular units, panels and all other sections of missiles and aircraft plus electronic



equipment. The fasteners are easily installed and require no tools of any sort—a press of the thumb is all that is needed. Deutsch Fastener Corp.

Circle 94 on postcard for more data

AUTOMATION News Report

(Continued from page 33)

other part under test.

This is modulated by a strain gage in a Wheatstone Bridge Circuit, and the radiated signal is detected by a stationary pick-up coil feeding an oscilloscope.

Batteries, oscillator, and amplifier are housed in three separate boxes clamped to the shaft in weight-balanced positions. Signals from several strain gages can be transmitted through a signal coil when individual oscillators are used.

TEMPERATURE-SENSITIVE SWITCHES

Engineers have long recognized the need for an inherently failsafe device to protect electric motors against overheating.

Now Westinghouse Electric Corp. has developed a new family of solid state devices that act as temperature-sensitive switches to de-energize a motor or give a signal when it overheats.

When the temperature of one of these devices—called Positive Temperature Coefficient Thermistors—reaches the critical point, its resistance rises abruptly and it functions as an open switch. When the temperature falls below this point, resistance drops and it functions as a closed switch.

Temperature ranges in which switching occurs can be controlled by varying the composition of the thermistors during manufacture. The new devices are in the form of ceramic disks—about the size of aspirin tablets—to which a metallic surface has been applied. A complete thermistor results when the disks are fitted with leads, insulated, and encapsulated for the right mechanical, electrical, and thermal properties.

Westinghouse will use the new devices in its new Guardistor system, now being tested in the field for protecting hermetic motors against overheating. In this application, small thermistor elements are imbedded in the winding of the motor during manufacture. Small insulated lead wires are brought out and connected to a small external relay which disconnects the motor from the line when overheating occurs.

METALS

(Continued from page 39)

have climbed from 51,500 tons a month to 83,600 tons in November, with a peak of 93,200 tons in October. Within four months stocks have been reduced 26 per cent from an unwieldly total of nearly 258,000 tons in July.

The outlook for 1959 is good. Demand for galvanized products continues at peak, with suppliers well sold into January. With an increased sales tempo in Detroit there has been a stronger call for the Special High grade from the diecasters, which is likely to continue in the months ahead. Imposition of quotas has definitely cut down the amount of imports that was causing havoc in the domestic market, yet London has remained surprisingly firm in spite of curtailment in sales to this country. The present 111/2 cent price appears likely to hold and even advance in the first quarter of the new year.

Lead in Slow Demand

Lead ended the year quietly. Sales were slow. The 13 cent price held firm but there was little anticipation of a further rise. Rather belated statistics showed that total stocks of lead held by smelters and refiners finally registered a decline for the year but were still well above the level of a year ago. Indicating the rather slow demand for the metal, domestic mine output for the first ten months of the year was off 22 per cent from the 1957 comparable period.

In the London market lead has sagged under the 9 cent equivalent which represents a 4 cent differential below the New York price. This spread has caused considerable concern in the lead industry as it could result in an increase in the volume of manufactured lead products shipped into this country.



To you this is important because today's production useage of screws can change suddenly. Southern prepares for your unusual requirement, large or small, through an inventory in excess of 1,500,000,000 screws.

Depend on Southern because this inventory and the production capacity that backs it up is insurance that you will always get the screws you need when you need them.

Mail the coupon today for a current copy of Southern's Stock List, and for complete details about our new timeand money-saving pallet system.

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Southern Screw Company P. O. Box 1360 Statesville, North Carolina
Mail me your Current Stock List and infor- mation about the new palletizing system designed to save us time and money.
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Circle 122 on Inquiry Card, for more Data

WHY MICROHONING*

OF GUIDE PIN BUSHINGS ASSURES FUNCTIONAL PRECISION, LONGER LIFE, LOWER COSTS

Lamina Dies and Tools, Inc., a pioneer in the development of bronzeplated guide pin bushings (bronze is electroplated on hardened steel for combined strength and smoother action), required a processing method that would economically produce bushing bores having dimensional precision, accurate geometry, functional surface characteristics, and consistent duplication to exacting specifications in every bushing.

In developing processing methods for the bushing bores, Lamina engineers found that Microhoning is best for generating final precision and functional surface characteristics at lowest cost per bushing.

Bronze, bronze-plated or steel bushings from ¾" to 4½" in diameter are Microhoned on this Hydrohoner. Stock removal is from .001" to .003" and average unit cycle is 30 seconds. Machine is equipped with automatic size control and tool expansion.





Characteristic cross-hatch lay pattern

Why? Because Microhoning generates a round, straight cylinder along the neutral axis of the bore; size and geometry of bushings up to $2\frac{1}{2}$ " in diameter are held to .0001" tolerances; contact area between bushing and guide pin is 25% greater than obtainable by other final processing methods. In addition, the characteristic cross-hatch lay pattern generated by Microhoning provides a "built-in" lubrication system in each bushing bore. This combined with the clean-cut surface prevents seizure or scuffing during operation of bushing. Finally, the self-dressing action of Microhoning abrasives assures continuous cutting efficiency and identical geometry, dimensions and surface finish in every bushing bore.

Thus, Lamina realizes, through Microhoning's generation of quality surfaces and precision bores, the full performance potential of bronze, bronze-plated or steel guide pin bushings—longer life, smoother action, lower costs.



Learn how Microhoning provides efficient stock removal, closer tolerances and functional surfaces—SEND FOR FREE LITERATURE.

* Registered U.S. Patent Office

MICROMATIC HONE CORP.

Circle 123 on Inquiry Card, for more Data



Russia's steel tonnage nearly doubled and cement tonnage nearly tripled between 1950 and 1957.

Soviet production of powerdriven presses and forges in 1956 was 85 per cent of U. S. production.

Earnings of the aircraft industry, based on sales during the 1946-1956 period, were less than half the amount earned by all other manufacturing industries.

The aircraft and missile industry reinvested 61 per cent of its earnings compared with 43 per cent for other manufacturers.

Six of the largest blocks of high-grade graphite ever made—they weigh 2½ tons each—are being used at an aircraft plant to turn out stainless steel parts for a supersonic bomber.

The cost of goods and services purchased by the Federal Government — principally national defense — has increased 35 per cent since 1947. This means that for each \$1 million expended in 1947 we would have to pay \$1.35 million today to buy the same goods and services.

Cooling system on a supersonic bomber does a job equivalent to a 160-ton- α -day ice making machine.

More than 200 measurements, involving the recording of 200,000 data points, are made during a missile test flight.

Position Wanted

ENGINEERING EXECUTIVE—Competent recognized I/C ENGINE ENGINEER. Highly successful background of engine design, test, development, realistic testing in laboratory and field. Expert engine troubleshooter. Primary experience W/C gasoline H.D. truck engines. Also diesel, automobile, industrial, marine, military. Adept in planning, organization, leadership. Early forties, B.M.E. Desires engineering executive position. Resumé delivered upon interview, travel expenses required. Reply Box A.I., 103 Pallister, Detroit 2, Mich.



For the first time both political parties are now alarmed over inflation. Up to now, each has regarded inflation as a minor political pain. Nothing to worry about; it'll go away.

But inflation is not only not going away—it's getting out of control. And—worst of all—people both in the U. S. and abroad are catching on to the fact that inflation is today a built-in feature of the economic philosophy of both U. S. political parties.

Genuine dismay on the part of the politicians is setting the stage for a serious attempt to "do something" about it. Important national leaders, such as Senate Majority Leader Lyndon Johnson and Federal Reserve Chairman William M. Martin, are now openly calling for Federal action to take at least some of the horse-power out of inflation.

Mr. Martin warns that foreigners are finally beginning to lose faith in the value of the U. S. dollar. "To the foreigner, much more than to Americans, the dollar is the symbol of this country's strength," he says. He reports that in a trip abroad he found the creeping mistrust in the dollar "among intelligent and perceptive men," not merely among speculators.

Vice-President Nixon has silently taken over control of the Republican Party. He has accomplished this largely through the inaction of President Eisenhower on partisan political matters.

Working hand-in-hand with Republican regulars in the Congress, Nixon is reshaping the party in his own image. As time passes, he is to encounter stiff opposition, particularly in the East, from pro-Rockefeller forces.

HOW MICROHONING*

OF GUIDE PIN BUSHINGS PROVIDES FUNCTIONAL PRECISION, LONGER LIFE, LOWER COSTS

honing to generate final precision and functional surface characteristics in bushing bores at minimum cost.

Microhoning's low-velocity, controlled abrading technique removes a minimum of the bronze plating to obtain accuracy and functional surface characteristics. Thus, as much as possible of bronze plating is conserved and a uniform thickness of bronze throughout the bore is assured.





Above is a typical Lamina guide pin bushing. These bushings range in diameter from ¾" to ¼½". An air operated, three-jaw fixture rigidly holds the work piece and is easily adapted to bushings of any size.

Because Microhoning tools have universal joints, they follow the neutral axis of the bore in generating round, straight cylinders. Since the bore location remains unchanged, concentricity between bushing I.D. and O.D. is obtained.

The combined reciprocating and rotating motions of the Microhoning tool creates on the bore surface a cross-hatch lay pattern that functions as a "built-in" lubricating system. For, the multitude of minute, diamond-shaped plateaus—over which the load is evenly distributed—are separated by a network of valleys that holds the lubricant. This better method of lubrication plus the clean-cut Microhoned surface prevent seizure or scuffing of bronze, bronze-plated and steel bushings. And, the self-dressing action of Microhoning abrasives maintains cutting efficiency to assure the same surface finish is developed in every bushing bore.



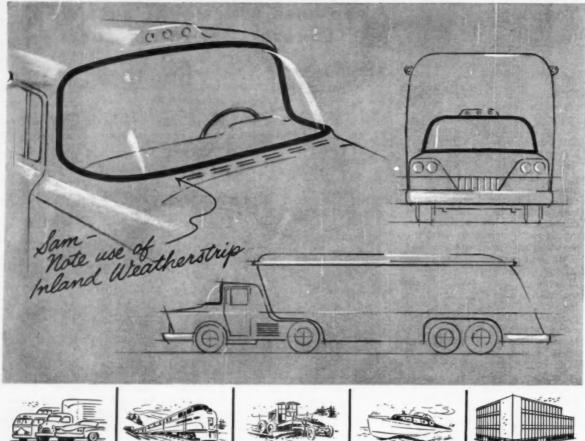
Learn how Microhoning provides efficient stock removal, closer tolerances and functional surfaces—SEND FOR FREE LITERATURE.

*Registered U.S. Patent Office

MICROMATIC HONE CORP.

NO LEAKS,

plus freedom to design!





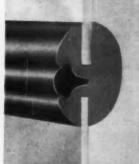








Commercial Structures



ZIPS IN. Filler strip zips into a much smaller channel, creating a compression that is a tight. permanent leakproof seal.

You seal out leaks for keeps when you design with Inland Weather Strip. Inland's unusual filler strip zips into a much smaller channel, keeps both glass and body panel under a powerful compression.

You save because no special moldings, channels, binders, or cements are needed. Can be installed quickly and easily; replacement takes but minutes.

Versatility of Inland Weather Strip gives you complete design freedom. Specify Inland Self-sealing Weather Strip, it fits any size or shape of glass.

Write, wire, or phone today for details. Available in standard sizes or made to your specifications. Catalog on request.



INLAND SELF-SEALING WEATHER STRIP

Inland Manufacturing Division, General Motors Corporation, Dayton, Ohio

Vacuum Cleaner Manufacturer Specifies



Bending vacuum cleaner wand. A variety of fabricating operations also is performed on Ohio Special Quality Seamless Tubing.

Value analysis showed it would be more economical to buy than produce fabricated welded tubing parts for our new cleaner. What's more, we could avoid additional capital investment in equipment.

"So we added Ohio Seamless to our production line. They have the equipment and facilities to meet our design requirements and to hold to our steppedup schedules. And we don't pay shipping costs on scrap — just on finished parts . . .

Let Ohio Seamless translate your designs into finished parts...conserve your capital...cut your production and shipping costs. Contact your Ohio Seamless representative, listed in the Yellow Pages, or the mill at Shelby, Ohio — Birthplace of the Seamless Steel Tube Industry in America.

AA-8847



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of Copperweld Steel Company · SHELBY, OHIO

Seamless and Electric Resistance Welded Steel Tubing . Fabricating and Forging

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New Fisher Body Plant at Mansfield

(Continued from page 36)

EP-32. The welding presses all were supplied by Danly.

At Mansfield scrap represents about 30 per cent of all sheet metal consumed daily. This requires special scrap handling facilities. Briefly here is how they shape up. In the first place, each press that handles trim and blanking operations is provided with a chute, ex-

tending upward from the floor to catch scrap ejected from the die, and extending downward through the floor so as to unload onto the scrap conveyor.

Scrap conveyor lines are arranged below each of the 26 lines of presses, terminating at the junction of two heavy duty conveyors extending across the press shop at

right angles with the feeder conveyors. At the center, both of these conveyors discharge onto a single conveyor line, extending out of the building and elevating upward to the ceiling of the scrap baler house outside. This elevated conveyor spans a distance of some 300 ft.

Coming to the baler house, we find two large Logemann balers, mounted side-by-side on an elevated platform. They can handle up to 1026 tons of scrap per day. The elevator transports the loose scrap to a hopper mounted over the balers and from here the scrap is dumped into an automatic weighing hopper on each side. As a hopper is filled to standard weight, it will turn and dump the load into one of the two balers.

The baler operator, who is strategically located to view the loading of freight cars outside the building, also controls the spotting of cars.

Storing of finished stampings and assemblies as well as material handling, particularly in loading freight cars for shipment, are among the most important functions at Mansfield. The supervisor of this function must be alert to any possibility of reducing handling to expedite the operation and reduce costs. One of the latest developments stemming from these considerations is a process termed "scoop" loading. This is done by using an industrial truck fitted with an enormous scoop loader. The scoop is made wide enough to extend the full width of a freight car. All parts that can be nested conveniently are handled by this means. The scoop gathers a full load from the small shop truck, compacts it, then elevates and lifts to position the load in the car.



--OEM* EQUIPPED WITH ENSIGN

Here again is another fine example of tractor engineering in which top-notch performance on LP-Gas assures the farmer of unprecedented economies in fuel and engine maintenance. We are proud indeed to have our LP-Gas carburetors included as original equipment on Minneapolis-Moline tractors.

As the leading manufacturer of LP-Gas carburetion, we are constantly in search of better methods and materials to give added years of economical engine operation on tractors equipped with Ensign. We have gained valuable experience in this field and are most happy to share it with you. Write us for recommendations on your carburetor needs. Ensign dealers and representatives cover the nation. Insist on Ensign—accept nothing less! *OEM means "Original Equipment Manufacturer." It means that the manufacturer of this tractor has chosen Ensign carburetion as standard equipment.



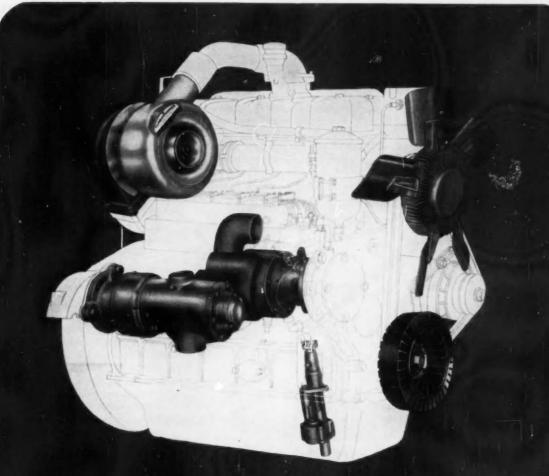
ENSIGN CARBURETOR COMPANY

1551 E. Orangethorpe, Fullerton, California Branch Factory: 2330 W. 58th Street, Chicago, Illinois

Young Spring Will Open New Parts Plant in Ohio

Young Spring & Wire Co. expects to be in operation soon in a new 66,000 sq ft plant in Archbold, O., where it will make padding supports for automobile seating.

The plant will be the company's third in Ohio and 18th outside the Detroit area. The padding supports formerly were made in Detroit.



FLUID FLOW & VIBRATION DAMPING PRODUCTS

SCHWITZER CORPORATION INDIANAPOLIS, INDIANA

TURBOCHARGERS SUPERCHARGERS FAN BLADES

FAN DRIVES
ACCESSORY DRIVES
VIBRATION DAMPERS
AIR STARTING MOTORS

WATER PUMPS OIL PUMPS SHAFT SEALS

New Car Design

(Continued from page 44)

Installation has been simplified, operation has been improved, and control mechanism simplified, in many instances through the use of pushbutton controls. On the other hand, pushbutton controls took a nose dive at M-E-L with the elimination of these controls for automatic transmission operation.

Despite the discussion of unitized body construction in recent years there has been no evidence of any general move in this direction, except for the Lincoln and four-passenger Thunderbird. On the other hand, some of the aluminum producers have been proposing an all-aluminum or part-aluminum body structure in which extrusions and die castings could be combined to make an interesting unitized body structure of adequate strength but much lighter than conventional practice.

The so-called no-slip differential

has been making quiet but important gains. It is not too expensive as accessories go and has advantages that could be capitalized. It has the making of an item that could become standard equipment as volume grows.

Another interesting and useful device is the Perfect Circle speed control. It was offered as an accessory item on Chrysler and Imperial last year, now is available as the Cruise Control on Cadillacs. It is invaluable for those who roam the highways, particularly on the high speed toll roads.

Brake Problems

Brakes still remain a major problem and will continue to be a problem so long as car weights remain at present levels. Buick found a solution in the use of aluminum brake drums at the front. Several other GM divisions have been able to increase cooling in various ways, including an increase in the weight of metal in the brake drum and in extending the lip of the drum farther into the air stream. The basic problem still is there and may require a radical solution.

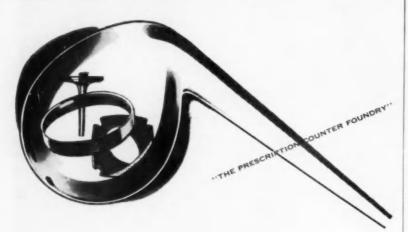
Unless something happens to change the picture we can look to 1960 as the year of decision. Some of the features discussed here are bound to come up in the announcements of prominent makes.

Automobile Industry

(Continued from page 42)

Other top stories during 1958 saw Chrysler Corp. purchasing a large share of stock in Simca, French automobile manufacturer. Chrysler's chief aim was to broaden its own world-wide distribution network with the addition of Simca dealers.

Studebaker-Packard, abandoned by Curtiss-Wright, laid out a reorganization plan which eventually will provide the Corporation with more working capital and a broader base of operations. Diversification plans in the works could lead the company into manufacture of most anything from textiles to recordings. The small Lark was a key to the refinancing plans.



METICULOUS CONTROLS

every hour, every heat, every day

Small ferrous alloy castings, electrically melted, and produced in high volume, have been our business since 1946.

But, in every instance, customers' needs have been unusual—involving controls to such exacting specifications that we could not rely upon ordinary foundry practices. At every critical point in the process, our own "technical policemen" are on duty every operating hour.

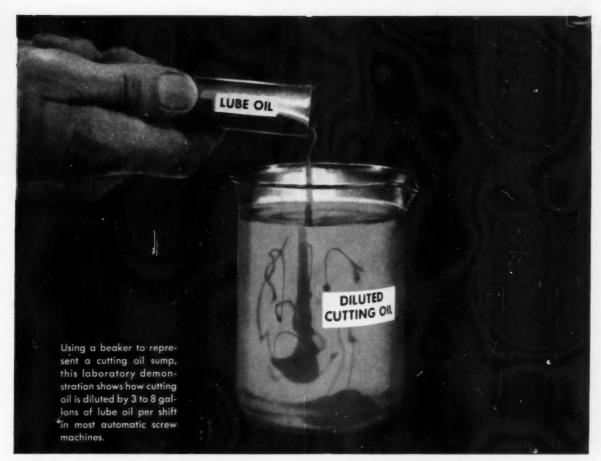
These manufacturing controls supplement our laboratory practice, and they make it possible to maintain the exacting customer specifications in high volume.

Suppliers of critical component castings to the automotive, aircraft, hydraulic, and special machine industries since 1946.



ENGINEERING CASTINGS, INC.

MARSHALL, MICHIGAN



It happens in 7 out of 10 automatics!

Diluted cutting oil can cut output 33%

No matter how careful your lubricating techniques, you still can't stop lube oil from leaking into the cutting oil sump on 70% of automatic screw machines. As cutting oil is diluted, it loses strength-ingredients that make it efficient become less and less effective. The natural consequence is shortened tool life, more downtime and a higher percentage of rejects.

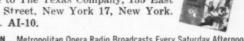
Texaco Cleartex can end this problem forever. All you have to do is use Cleartex for both cutting and lubrication . . . and watch your production rise. The exceptional chemical stability and load-carrying ability of the Cleartex series make them equally suitable for use as cutting oils, lubricants and hydraulic fluids. (70% of all automatic screw machines can benefit from the "Cleartex Cure!")

TAKE THE CLEARTEX CURE SOON!

Write today for your copy of Texaco's new booklet-"Cleartex in Automatic Screw Machines." This new illustrated guide will fill you in on the details, show you

where you may be losing profits and how to avoid it . . . Or contact your local Texaco Lubrication Engineer soon for an authoritative survey of your auto-

matics. Just call the nearest of more than 2,000 Texaco Distributing Plants, or write to The Texas Company, 135 East 42nd Street, New York 17, New York. Dept. AI-10.



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LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

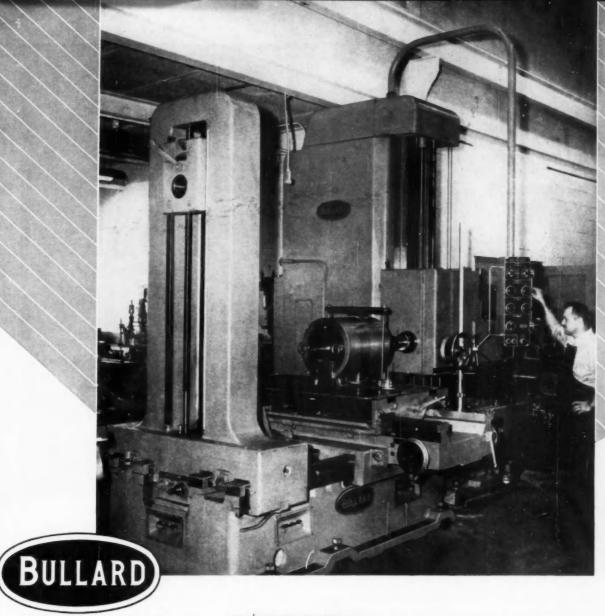
VARIABLE* RATIO STEERING

*Originated and developed by . . . STEERING

Faster steering and quicker recovery for cornering . . . slower steering and greater stability for straight-ahead handling! These are the twin benefits of variable-ratio steering, originated and developed by Ross. Steering specialists since 1906, Ross provides the right gear for every steering need—manual or power, constant or variable ratio. Ross invites your steering inquiry.

ROSS GEAR AND TOOL COMPANY, INC. LAFAYETTE, INDIANA Gemmer Division—Detroit





"It's Really RUGGED and Versatile"

"In our business," says Mr. Stanley McDonald,
Plant Foreman of E & M Enterprises, Inc. of Middleport, New York,
"building special machinery for a wide segment of industry, we needed
a horizontal boring machine that was rugged, accurate, faster,
easy to set up and control. We decided that the Bullard H.B.M., Model 75
best met our requirements. Now, after more than two years of operation,
we're convinced we made the right choice and bought the right machine."

A call to the nearest Bullard Sales
Office or Distributor will convince you
that the Bullard H.B.M., Model 75
is the right choice for you.

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THE SPIRIT OF '76 . . . exemplifying strength—dependability—determination to move forward through the years.

Wyman-Gordon enters its 76th year still forging ahead with new forging techniques—still meeting the challenge of the seemingly impossible in this age of power and speed on the ground—in the air—and in outer space.

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1883 to the forging industry's most modern testing and research facilities in the extensive laboratories of Wyman-Gordon today—assurance of the ultimate in forging quality.

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Established 1883

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ADDRESS: Philadelphia, Pennsylvania.

PRODUCT MANUFACTURED: Automotive Metal Stampings.

3M ABRASIVE USED: "PG" Wheels.

HOW 3M ABRASIVES ARE USED: Finishing operation. Remove die marks, scratches, and other forming defects from cold-rolled carbon steel auto grille bars, prior to plating.

OPERATIONAL DATA ON 3M METHOD: Grit 220 Resin Bond Cloth "PG" Wheel on double-spindle floor lathe with buff-wheel.

OPERATIONAL DATA ON PREVIOUS METHOD: 2-station, 3-step method. 1st, #120 disc; 2nd, set-up wheel; 3rd, buff-wheel.

PROVEN ADVANTAGES OF 3M METHOD: Former 3-step operation reduced to 2 steps; "PG" Wheel and Buff. "PG" Wheel leaves no scratches on work piece; speeds production 10-15%.

OTHER 3M ABRASIVE PRODUCTS IN USE: "Three-M-ite" Resin Bond Cloth Portable "PG" Wheels on hand-grinders are used to remove in-use scratches, other imperfections from dies, without removing them from press. "PG" Wheels replaced hand methods, reduced repair time from 14 hours to 30 minutes.

WANT MORE INFORMATION? Send for free manual, "Modern Metal Finishing with 3M 'PG' Wheels." Write to 3M Co., St. Paul 6, Minn., Dept. RV-19.

"PG" Wheels are manufactured in U.S.A by 3M Company, St. Paul 6, Minn. Export: 99 Park Avenue, New York. Canada: London, Ontario

3M Coated Abrasives

"PG" WHEELS

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How to squeeze more production from your automatic forging equipment ... at no extra cost

AUTOMATIC forging machines are no better than the uniformity of the steel you process. When structural or chemical changes occur in the steel you're using you have to interrupt operations to adjust your equipment. And you lose the continuous production you paid for!

You can avoid these interruptions by using uniform steel. Timken® electric furnace fine alloy steel, for instance. It's uniform from bar to bar, heat to heat, order to order.

We take many extra quality-control steps to make sure it's uniform—many of them were American steel industry "firsts". For example, our magnetic stirrer for molten steel assures equal distribution of alloys, uniform temperature and working of the slag. A direct-reading spectrometer insures exactly correct composition to the very moment a heat is tapped. And individual order-handling assures uniformity that meets your own end-use requirements.

You'll squeeze the most production from your automatic forging equipment, at no extra cost, by specifying Timken fine alloy steel. You'll get uniform steel and faster, continuous production. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO".

TIMKEN Fine STEEL

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS STEEL TUBING



CHECK THESE 10 POINTS OF T-J SUPERIORITY

1 One Piece Piston

2 Hard Chrome Cylinder Bore and Piston Rods

3 High Tensile Steel Tie-Rods

4 Cushion Adjusting Screw, Externally Adjustable

5 New Super-Cushion for air, or Self-Aligning Master Seal for Oil (T-J Patents)

6 Solid Steel Heads and Mounting Plates Standard all Models 7 Port Design Allows Minimum Pressure Drop on Inlet or Outlet

8 Chevron Type, Self-Adjusting Rod Packing

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10 Piston Rod, Extra Strong-Polished and Chrome Plated for Efficiency and Protection With the introduction of the ALL NEW T-J Squair Head, Tomkins-Johnson now offers industry the most complete design range of air and hydraulic cylinders. Presently available in bore diameters from 1½ to 8 inches, the T-J Squair Head is an interchangeable cylinder which produces maximum force and efficiency, with minimum pressures... and is also adaptable to the use of low pressure oil as the working medium. Write to The Tomkins-Johnson Co., Jackson, Michigan, for Bulletin #SQ 10-58 and complete details.





The Standard of Quality and Performance Since 1813 Has Proven Its Place in the Automotive Industries in 1959

Few American companies—and no other in the automotive field except Saco-Lowell—can point to 145 years' experience in precision metal manufacturing. But Saco-Lowell, founded in 1813 by Francis Cabot Lowell, and with a solid foundation of craftsmanship, pioneered in precision manufacture as applied to textile machinery and laid the humble beginnings of what is now the hallmark of the automotive industry—mass production.

TODAY this heritage is extended to automotive parts and ordnance materiel and parts. Saco-Lowell has for several years proven itself as a producer of universal joints, differential gear case assemblies, exhaust control valves, pinion and side gears and rear axle shaft assemblies. It previously has proven itself in the manufacture and assembly of machine guns.

What Saco-Lowell has done for others it can do for you.

To intensify our service for you, the automotive buyer, Saco-Lowell has established an Automotive Division, with general sales offices in Detroit. Buyers of automotive parts with an immediate quality problem and not unduly allergic to savings resulting from our Yankee frugality are asked to call or write for our new Automotive Division brochure.

SACO-LOWELL AUTOMOTIVE DIVISION SACO-LOWELL SHOPS

General Sales Office - 10340 Puritan Avenue, Detroit 38, Michigan

Canadian Sales Office - Yorkville Tower, 11 Yorkville Avenue, Toronto 5, Ontario

Executive Office - Saco, Maine

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also reaches men your salesmen cannot see and may not know—yet, as part of the buying team, their recommendations frequently determine the placement of orders.

Also Automotive Industries helps to create and maintain the good reputation of your product in quarters where that help will do the most good.



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Three sectors of the tapered por-tion of the CONELOK nut are preformed inwardly (Fig. 1). When

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conforming sectors are elastically

returned to a circular configura-

tion and create an inward and

downward pressure which pro-

duces intimate contact between

the load carrying flanks of the nut

and bolt threads (Fig. 2). The

shape of the cone sector displace-

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tion contact area. . . . The closed stress path in the locking portion of the nut and the advantageous distribution of locking pressure, produce a locking device of high fatigue life . . . and equivalent locking force is exerted at only a fraction of the stress of any slotted type locknut. CONELOK main-

tains its locking action through many re-applications. . . . It is adaptable to high, and low torque assemblies . . . to high torque stop-nut applications . . . and may be obtained in sizes from No. 10 through 1½", Full and Thick di-mensions are "Standard". . .

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AUTOMOTIVE INDUSTRIES, January 1, 1959

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They cut 6" (and smaller) radius.

Models are available for cutting corrugated metal, fibre glass and plastic without cracking or chipping. Other models for cutting wire netting, irregular rods, gaskets, etc.

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FREE LITERATURE

Forged Steel Rolls

Bulletin 602 contains a complete description of the Marathon line of forged alloy steel rolls for production of a wide variety of steel sheet, strip, and foil, and non-ferrous metals, from copper to brass to gold, platinum, and other precious metals. Marathon Specialty Steels, Inc.

Inspection Instrument

Bulletin 102 describes and illustrates the Tol-Check, an instrument for checking the tolerance accuracy of surface plates. Herman Stone Co.

Pad Material 3

A brochure on shock dampening and vibration-isolation Sorbtex, a preformed pad material for heavy machinery makers and plant maintenance engineers, is available from Voss Belting & Specialty Co.

Wheel Equipment

A 94 page catalog presents information and engineering data on Goodyear Tire & Rubber Company's rims, wheels, tools and rim accessories. The text includes information and pictures on rim research and related data.

Bimetal Thermostats 5

Bulletin 8400 presents information on a line of bimetal thermostats for use in appliances, apparatus, electronic and avionic applications. Steveus Mfg. Co.

Precision Turret Lathe

Publication 865 gives information about a new, small semi-automatic precision turret lathe. Features of the lathe include: an Auto-Index turret and Steady Rest which are controlled by the operating handle. The unit has a collet capacity of 0.625 in. The Challenge Machinery Co.

Rubber-Metal Products 7

A 12 page illustrated brochure on rubber-metal products, including bearings, bushings, couplings, mounts, sleeves and molded shapes, is available from Clevite Harris Products, Inc.

(Please turn page)

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- FREE LITERATURE - Continued -

Limit Switches

Catalog 84, 16 pages, covers a complete line of heavy-duty limit switches for industrial uses. It lists switches with a variety of contact arrangements, for either direct or alternating current applications. Several actuator designs in each switch type are shown. Micro Switch Div. of Minneapolis-Honeywell Regulator Co.

Blind Rivets

A six page brochure features engineering drawings and full specifications on a line of Pin-Grips for metalto-metal and metal-to-wood fastenings. A total of 154 different sizes

are listed. Star Expansion Industries Corn.

Milling-Boring

Publication of a book which tells how to improve milling and boring operations at reduced costs is announced by the Ingersoll Milling Machine Co.

Air Compressors

Bulletin SG-2, 12 pages, describing the Westinghouse Unit Type air compressors has been issued by the Le Roi Div. The bulletin describes G single-stage, YS single-stage, and YC

two-stage Westinghouse compressors ranging in size from 1/2 to 15 hp. Available pressures are from 80 to 250 psi.

Storage Unit

12

Bulletin 573 covering a high-capacity, demand-type storage unit has been released by Gear-O-Mation Div., Michigan Tool Co. The unit, for all types of parts that roll, uses a parts elevator and zigzag retaining tracks to store and/or feed up to 3000 parts.

Oscillating Conveyors

Booklet 2744, 24 pages, describes Flexmount, Coilmount and Torqmount conveyors. Ranging from the lightest to the heaviest capacities, the three units can handle material from 25 tph to 350 tph. Link-Belt Co.

Self-Swaging Nuts

Form 2447, four pages, covers a line of self-swaging, clinch-type nuts for putting load-bearing threads into thin metal. The nuts anchor firmly in sections as thin as 0.020 in. Standard Pressed Steel Co.

Data Loggers

A four page brochure describing the features, applications, and specifications of the Gilmore Data Logger line is being offered by Gilmore Industries, Inc.

Bearings-Bushings

Wakefield Bearing Corp. has published a fully illustrated 72 page catalog on Graphex, Coprex and Woodex oiless and self-lubricating bearings, bushings and machine parts.

Tape-Controlled Tool

The Milwaukee-Matic, a tape controlled machine tool that provides milling, drilling, reaming, tapping and boring all around a part for the small and medium lot manufacturer is described in Bulletin TG-59. Kearney & Trecker Corp.

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FREE LITERATURE— continued

Tumbling Barrel

Bulletin 452-D covering auxiliary tumbling barrels for wet blast equipment has been published by the Techline Div. of Wheelabrator Corp. Deburring and precision cleaning of small parts that can be tumbled are accomplished rapidly and uniformly in wet blast equipment through the use of the tumbling barrels.

Precision Boring Mach. 19

The Olofsson Model 22 heavy-duty, high production precision boring machine engineered for both precision and heavier machining operations is described in Bulletin OL 1258, four pages. Olofsson Corp.

Power Package

Four hundred power packages, incorporating unit-mounted motor, inductor-alternator and controls, are described in detail in six page Bulletin 307 issued by Safety Industries, Inc.

Abrasive Head 21

Abrasive Machinery's Smooth-O-Matic contour sanding head for use on wood or metal is described in a two page circular. Its design incorporates coated abrasive supply rolls which advance the abrasive as it is required. Abrasive Machinery Corp.

Snap Torque Wrenches 22

A catalog sheet, illustrating and describing its line of pre-set, snap torque wrenches has been published by the Skidmore Engineering Co.

Insert Tool Holders 2:

Catalog 581 describes a line of throw-away insert tool holders that eliminates the need for separate chip breakers. The design features a top clamp that is carbide hard faced, which combines a chip control with insert clamping. The Viking Tool Co.

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FREE LITERATURE—Continued -

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FIRST CLASS

Welding Wire

Four page Bulletin DH-1218-0 lists typical uses of gas welding rods, bare electrodes, automatic welding wire and metal spray wire. The folder also details the physical properties as welded, gives analyses, tensile strength, elongation and average Rockwell hardness numbers. American Chain & Cable Co., Inc.

Radio Receiver

25

Lear's Navcom-100, 190 channel. crystal-controlled VHF radio receiver for private and business aircraft is described in a six page catalog. Lear-Cal Div., Lear, Inc.

Molybdenum Co.

28

Molybdenum Entitled "The Role of Molybdenum in Steel Castings for Industrial Equipment," a brochure discusses hardenability, tensile properties, fatigue, hardness, wear and impact resistance. machinability, and weldability of cast steels. Weli planned tables, graphs

Optical Lead Checker 27

and charts are included. Climax

Model 1218A Gear Checker-with an integrated optical system for easy and accurate checking of gear leads -is described in a four-page, twocolor bulletin distributed by Michigan Tool Co.

Fire Truck Engine

Hall-Scott six-cylinder Model 590 GV-4 gasoline engines designed primarily for use in fire trucks are described in two page Bulletin HS-3 issued by Hercules Motors Corp.

L-P Gas Diagram

Available from Century Gas Equipment Div., Marvel-Shebler Products Div., Borg-Warner Corp., Decatur, Ill., is an LP-Gas Engine installation diagram prepared in wall chart form picturing ignition, carburetor, condenser, flow, and fuel supply systems. Charts may be purchased ten in a mailing tube for \$5.50 postpaid or singly, \$.90 each postpaid.

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Production and maintenance of wire harnesses are greatly simplified with this new shielding and jacket combination made with Geon polyvinyl material. All you do is zip it on. Saves time and equipment during manufacture—makes it easy to replace the jacket if it has to be removed to get at wiring for service.

For regular RF shielding, glass cloth saturated with Geon polyvinyl material is laminated to aluminum foil. It gives 100% coverage to provide immediate grounding of RF and UHF interference. The outer surface, also of Geon, has

zipper tracks sealed in. A pull tab can easily be used to facilitate closure.

For heavier magnetic shielding, special steel foil is laminated between layers of Geon. Lead saturated glass cloth is available for radiation problems.

Geon provides high insulation resistance, heat stability and extra strength, as well as accuracy in molding. It's another example of versatile Geon proving the key to a dramatic new product. For information, write B.F. Goodrich Chemical Company, Dept. LN-1, 3135 Euclid Avenue, Cleveland 15, Ohio.



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** Bearing Solved Response Problem In New Automotive Speed Control Device!

CUSTOMER PROBLEM:

Extensive testing revealed sluggish response of automobile speed control device.

SOLUTION:

N/D Sales Engineer, in cooperation with manufacturer, recommended replacing existing pure thrust bearing and bushings with New Departure double-shielded ball bearings. These light-duty, non-loading groove bearings, with uninterrupted ball raceways, withstand radial and thrust loads in any combination. This

change resulted in virtually friction-free operation of the speed control device, correcting the response problem. What's more, these New Departures eliminated a lubrication problem and simplified assembly and maintenance.

Perhaps there's a New Departure automotive production ball bearing that will help solve a problem in your product . . . or produce an over-all cost savings. For more information, write Department C-1.

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